K.S. Rangasamy College of Technology

(Autonomous Institution affiliated to Anna University, Chennai)

CURRICULUM AND SYLLABI of

B.E. Computer Science and Engineering
(For the batch admitted in 2024– 25)

R 2022

Courses Accredited by NBA, Accredited by NAAC with 'A^{++}' Grade,
Approved by AICTE, Affiliated to Anna University, Chennai.

KSR Kalvi Nagar, Tiruchengode – 637 215.
Namakkal District, Tamil Nadu, India.

Department of Computer Science and Engineering VISION

To produce competent software professionals, academicians and researchers through Quality Education.

MISSION

- To produce competent software developers, system designers and network programmers through innovative teaching-learning practices.

- To keep abreast of the latest developments and technological transformations in computer science and engineering for social benefits.

Program Educational Objectives (PEOs) for B.E. (CSE) Programme

PEO1: Graduates will provide effective solutions for software and hardware industries by applying the concepts of basic science and engineering fundamentals.

PEO2: Graduates will be professionally competent and successful in their career through life-long learning.

PEO3:
Graduates will contribute individually or as member of a team in handling projects and demonstrate social responsibility and professional ethics.

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem a n a l y s i s : Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design /development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

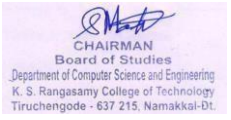
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one‘s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024



Program Specific Outcomes (PSOs) for B.E.(CSE) Programme

Engineering Graduates will be able to:

PSO1: Apply standard Software Engineering practices and strategies in software project development using open-source programming environment and deliver a quality product for business success.

PSO2: Analyze and Interpret data by applying advanced data analytic models for decision making in Complex Problems and facilitate inter disciplinary research.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) WITH PROGRAMME OUTCOMES (POs)

The B.E. Computer Science and Engineering Programme outcomes leading to the achievement of the objectives are summarized in the following Table.

Programme Educational Objectives	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO 1	3	1	3	2	2	1	1	1	2	2	3	1
PEO 2	3	3	3	2	2	1	1	1	2	2	3	1
PEO 3	3	2	3	2	2	1	1	1	3	2	3	1

Contributions: 1- low, 2- medium, 3- high

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

MAPPING-UG-COMPUTER SCIENCE AND ENGINEERING

Year	Sem	Course Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I	I	60 EN 001	Professional English - I								2	3	3	2	3
		60 MA 001	Matrices and Calculus	3	2			2							
		60 EE 001	Basic Electrical and Electronics Engineering	2.6	2.8	1.7	1.7	2	2	2.3	1.5	2	2	2	2.25
		60 ME 002	Engineering Graphics	3	2.8	3		3			3				
		60 CS 001	C Programming	3	3	3		3				2	2		2
		60 MY 001	Environmental Studies and Climate Change	3	2			3	2.7	2.8	2				2
		61 GE 001	Heritage of Tamils*							3	3		2		3
		60 CS 0P1	C Programming Laboratory	3	3	3		3				2	2		2
		61 ME 0P1	Fabrication and Reverse Engineering Laboratory	3	2	3			2	2		3			3
I	II	60 EN 002	Professional English - II								2	3	3	2	3
		60 MA 003	Integrals and Partial Differential Equations	3	3			2							
		60 PH 004	Physics for Computer Technology	3							2		2		
		60 CH 004	Engineering Chemistry	3	2.6										
		60 IT 001	Python Programming	3	2	3	2.8					2	2	2	2
		60 GE 002	Tamils and Technology	3				3	2	2.8	3	2.5	2.2		3
		60 CP 0P2	Engineering Physics and Chemistry Laboratory	3							2	2			
		60 IT 0P1	Python Programming Laboratory	3	2	3	2.8					2	2	2	2
		61 CS 2P1	Web Development	3	2	3	2.8					2	2	2	2

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

		60 CG 0P1	Career Skill Development - I								2	3	3	2	3
II	III	60 MA 010	Mathematical Statistics and Numerical Methods	3	2			2							
		60 CS 003	Data Structures	3	3	2	2.6	2	2	2	2.4	2.6	2		2
		60 CS 004	Java Programming	2.6	2.8	2.6	2	3			2	3	3	2	3
		61 EC 001	Digital Logic and Microprocessor	3	3	3	3	2					1	1	1
		60 CS 301	Computer Networks	2.8	2.6	2.8	2	2.3		2	2.5	2.5	2.5		2
		60 MY 002	Universal Human Values						3	3	3	2.8	3	2	3
		61 CS 0P3	Data Structures Laboratory	3	3	2	2.6	2	2	2	3	2.6	2		2
		60 CS 0P4	Java Programming Laboratory	2.6	2.8	2.6	2	3			2	3	3	2	3
		60 CG 0P2	Career Skill Development – II								2	3	3	2	3

II	IV	60 MA 017	Discrete Mathematics	3	2			2							
		60 IT 002	Design and Analysis of Algorithms	3	3	3	2	3					2		
		61 CS 401	Advanced Web Development	3	2	3		3				3	3	2	3
		61 CS 402	Database Management Systems	3	3	2		2	2	2		3			2
		60 CS 403	Software Engineering	3	3	2.8	2.6	3		2	2	2.5	2.3	3	3
		61 CS 4P1	Advanced Web Development Laboratory	2	2.4	3	2.4	2.2	2.8		3				2
		61 CS 4P2	Database Management Systems Laboratory	3	3	3		3	2	2		3	3		2
		60 CG 0P3	Career Skill Development – III	2.6	2.6	2.6	2.8		2.4				2	3	3
III	V	60 CS 501	Artificial Intelligence	3	2.6	2	2	2	2						2.4
		60 CS 502	Computer Architecture	2.6	2.4	2		2		2			2		2
		60 CS 503	Operating Systems	3	2.6	2.8	3			2			2		2.2
		60 CS 504	Formal Language and Automata Theory	3	3	2.4	2				2		1	1.8	2
		60 IT 003	Design Thinking	3	2.8	3	2.6	3	3	2.8	2.7	3	3		
		60 CS 5P1	Artificial Intelligence Laboratory	3	2.6	2	2	2	2						2.4

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

		60 CS 5P2	Operating Systems Laboratory	3	2.6	2.8	3			2		2	2		2.2
		60 CG 0P4	Career Skill Development – IV	2.6	2.6	2.6	2.8		2.4				2	3	3
III	VI	60 CS 601	Cryptography and Network Security	3	2.4	3					2	3	3	2	3
		60 CS 602	Principles of Compiler Design	3	2.8	2.6	2.2	2.6		2		2.6	2.4	1.6	2.6
		60 CS 603	Data Science	2.6	3	3	2.5	2.8	3	3		2		2	2.2
		60 MY 003	Startups and Entrepreneurship	2.8	2.6	3	2.4	2.2	2.5	1.7	1.8	1.3	2	2.2	2.4
		60 CS 6P1	Cryptography and Network Security Laboratory	3	2.4	3					2	3	3	2	3
		60 CS 6P2	Data Science Laboratory	2.6	3	3	2.5	2.8	3	3		2		2	2.2
IV	VII	60 HS 002	Engineering Economics and Financial Accounting	2.7	3	2.5	2.8	3	2	2.3	2			2.8	2.5
		60 CS 701	Cloud Computing	3	2	2	2	2						2	2.6
		60 CS 702	Deep Learning	3	3	3	2.6	3				3	2	2	3
		60 CS 703	Software Testing	3	2.6	2.75	3	3		2	2.5		2		3
		60 AC 001	Research Skill Development	2	2	2	2	3	2	2	3	3	3		3
		60 AB 001	National Cadet Corps(Air Wing)	3	2	1	1	3	3	3	3	3	3		
		60 AB 002	National Cadet Corps(Army Wing)						1		2.6				
		60 CS 7P1	Cloud Computing Laboratory	3	2.6	2.6		3	2	2	2	3	2	3	2
		60 CS 7P2	Project Work Phase-I	3	3	3	3	3	3	3	3	3	3	3	3
	VIII	60 CS 8P1	Project Work Phase-II	3	3	3	3	3	3	3	3	3	3	3	3

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

K.S. RANGASAMY COLLEGE OF TECHNOLOGY

Credit Distribution for B.E (CSE) Programme – 2024 – 2025 Batch

S.No.	Category	Credits Per Semester								Total Credits	Percentage %
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	2	2	-	-	-	-	3	-	**07**	**4.3**
2.	BS	4	12	4	4	-	-	-	-	**24**	**14.6**
3.	ES	14	-	3	-	-	-	-	-	**17**	**10.4**
4.	PC	-	7	14	16	20	14	11	-	**82**	**50.0**
5.	PE	-	-	-	-	3	6	3	3	**15**	**9.2**
6.	OE	-	-	-	3	3	3	-	-	**09**	**5.5**
7.	CG	-	-	-	-	-	-	2	8	**10**	**6.0**
8.	GE	GE I	GE II	-	-	-	-	-	-	**-**	**-**
9.	MC	MC I	-	MC II	-	-	MC III	-	-	**-**	**-**
10.	AC	-	-	-	-	-	-	AC	-	**-**	**-**
Total		**20**	**21**	**21**	**23**	**26**	**23**	**19**	**11**	**164**	**100**

HS – HUMANITIES AND SOCIAL SCIENCES

BS – BASIC SCIENCE
ES – ENGINEERING SCIENCES
PC – PROFESSIONAL CORE
PE – PROFESSIONAL ELECTIVES

MC – MANDATORY COURSES
OE – OPEN ELECTIVES
CG – CAREER GUIDANCE COURSES
GE – GENERAL ELECTIVE COURSES
AC – AUDIT COURSES

- Open Electives are courses offered by different departments that do not have any prerequisites and could be of interest to students of any branch

K. S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

HUMANITIES AND SOCIAL SCIENCE (HS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 EN 001	Professional English – I	HS	3	1	0	2	2	Basic knowledge of reading and writing in English
2.	60 EN 002	Professional English – II	HS	3	1	0	2	2	Basic knowledge of reading and writing in English and should have completed Professional English I.
3.	60 HS 002	Engineering Economics and Financial Accounting	HS	3	3	0	0	3	NIL
4.	60 AB 001	National Cadet Corps (Air wing)	HS	4	2	0	2	3	NIL
5.	60 AB 002	National Cadet Corps (Army wing)	HS	4	2	0	2	3	NIL

BASIC SCIENCE (BS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 MA 001	Matrices and Calculus	BS	5	3	1	0	4	NIL
2.	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	BS	5	3	1	0	4	NIL
3.	60 PH 004	Physics for Computer Technology	BS	3	3	0	0	3	NIL
4.	60 CH 004	Engineering Chemistry	BS	3	3	0	0	3	NIL

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
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CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.	60 CP 0P2	Engineering Physics and Chemistry Laboratory	BS	4	0	0	4	2	NIL
6.	60 MA 010	Mathematical Statistics and Numerical Methods	BS	5	3	1	0	4	NIL
7.	60 MA 017	Discrete Mathematics	BS	5	3	1	0	4	NIL

ENGINEERING SCIENCES (ES)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 ME 002	Engineering Graphics	ES	6	2	0	4	4	NIL
2.	60 CS 001	C Programming	ES	3	3	0	0	3	NIL
3.	60 EE 001	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3	NIL
4.	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2	NIL
5.	61 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2	NIL
6.	61 EC 001	Digital Logic and Microprocessor	ES	4	2	0	2	3	Basic knowledge of Electrical and Electronics Engineering

PROFESSIONAL CORE (PC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 IT 001	Python Programming	PC	5	3	1	0	4	Basic Knowledge of mathematics and programming

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	60 IT 0P1	Python Programming Laboratory	PC	4	0	0	4	2	Basic Knowledge of mathematics and programming
3.	61 CS 2P1	Web Development	PC	2	0	0	2	1	Basic knowledge of programming
4.	60 CS 003	Data Structures	PC	3	3	0	0	3	Basic knowledge of mathematics and programming language in C
5.	60 CS 004	Java Programming	PC	3	3	0	0	3	Basic knowledge of any programming language with ability to solve logical problems
6.	60 CS 301	Computer Networks	PC	5	3	0	2	4	NIL
7.	61 CS 0P3	Data Structures Laboratory	PC	4	0	0	4	2	C Programming
8.	60 CS 0P4	Java Programming Laboratory	PC	4	0	0	4	2	Basic knowledge of Java programming language with ability to solve logical problems
9.	60 IT 002	Design and Analysis of Algorithms	PC	3	3	0	0	3	Basic knowledge of Data Structures and Computer programming
10.	61 CS 401	Advanced Web Development	PC	3	3	0	0	3	HTML, CSS

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

11.	61 CS 402	Database Management Systems	PC	3	3	0	0	3	Data Structures
12.	60 CS 403	Software Engineering	PC	4	2	0	2	3	NIL
13.	61 CS 4P1	Advanced Web Development Laboratory	PC	4	0	0	4	2	HTML, CSS
14.	61 CS 4P2	Database Management Systems Laboratory	PC	4	0	0	4	2	Data Structures
15.	60 CS 501	Artificial Intelligence	PC	3	3	0	0	3	Linear Algebra
16.	60 CS 502	Computer Architecture	PC	3	3	0	0	3	Digital Logic and Microprocessor
17.	60 CS 503	Operating Systems	PC	3	3	0	0	3	Computer Architecture
18.	60 CS 504	Formal Language and Automata Theory	PC	5	3	1	0	4	Discrete Mathematics
19.	60 IT 003	Design Thinking	PC	4	2	0	2	3	Software Engineering
20.	60 CS 5P1	Artificial Intelligence Laboratory	PC	4	0	0	4	2	Linear Algebra, Basics of programming
21.	60 CS 5P2	Operating Systems Laboratory	PC	4	0	0	4	2	Computer Architecture
22.	60 CS 601	Cryptography and Network Security	PC	3	3	0	0	3	Computer Networks, Mathematical Knowledge, Programming Knowledge and Data Structures

Rev. No.4/w.e.f. 01.06.2024
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Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

23.	60 CS 602	Principles of Compiler Design	PC	5	3	1	0	4	Discrete Mathematics, Formal Language and Automata Theory
24.	60 CS 603	Data Science	PC	3	3	0	0	3	Fundamentals in linear algebra / statistics / probability
25.	60 CS 6P1	Cryptography and Network Security Laboratory	PC	4	0	0	4	2	Computer Networks, Mathematical Knowledge, Programming Knowledge and Data Structures
26.	60 CS 6P2	Data Science Laboratory	PC	4	0	0	4	2	Fundamentals in linear algebra / statistics / probability
27.	60 CS 701	Cloud Computing	PC	3	3	0	0	3	Networking, Databases, Operating Systems
28.	60 CS 702	Deep Learning	PC	4	2	0	2	3	Probability, statistics, linear algebra, calculus and Machine Learning Techniques
29	60 CS 703	Software Testing	PC	3	3	0	0	3	Software Engineering
30.	60 CS 7P1	Cloud Computing Laboratory	PC	4	0	0	4	2	Computer Networks, Operating Systems

PROFESSIONAL ELECTIVES (PE) / HONOURS
SEMESTER V, ELECTIVE I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.	60 CS E11	Data Mining	PE	4	2	0	2	3	Linear Algebra, Statistics and programming
2.	60 CS E12	Node.js and React.js	PE	4	2	0	2	3	HTML, CSS, JavaScript
3.	60 CS E13	Mobile Application Development	PE	4	2	0	2	3	Java Programming
4.	60 CS E14	Information Retrieval Techniques	PE	4	2	0	2	3	Data Structures
5.	60 CS E15	Graph Theory	PE	4	2	0	2	3	Linear Algebra
6.	60 CS E16	Industrial Cloud Practices	PE	3	3	0	0	3	Programming Skill, Computer Networks,DBMS
7.	60 CS E17	DevOps	PE	3	3	0	0	3	Programming Skill, OS and Networking

Note: Any of the elective course can be opted for honour degree

SEMESTER VI, ELECTIVE II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 CS E21	Generative AI	PE	3	3	0	0	3	Statistics, linear algebra, matrix, calculus,probability, programming languages and data modelling
2.	60 CS E22	Angular	PE	4	2	0	2	3	HTML, CSS, JavaScript
3.	60 CS E23	User Interface Technologies	PE	3	3	0	0	3	Web Development
4.	60 CS E24	Parallel and Distributed Computing	PE	3	3	0	0	3	Operating Systems
5.	60 CS E25	Cyber Forensics and Malware	PE	3	3	0	0	3	Operating Systems and Networking Fundamentals

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

6.	60 CS E26	C# and .NET Core	PE	4	2	0	2	3	Object Oriented Programming
7.	60 CS E27	Advanced Java	PE	3	3	0	0	3	Basics of Java

Note: Any of the elective course can be opted for honour degree

SEMESTER VI, ELECTIVE III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 CS E31	Prompt Engineering	PE	3	3	0	0	3	Artificial Intelligence and NLP
2.	60 CS E32	Full Stack Development	PE	4	2	0	2	3	Web Development
3.	60 CS E33	Salesforce	PE	4	2	0	2	3	Knowledge on Software Engineering and computer programming
4.	60 CS E34	Game Design Technologies	PE	3	3	0	0	3	Programming Knowledge
5.	60 CS E35	Block Chain Technology	PE	3	3	0	0	3	Data Structures, Cryptography
6.	60 CS E36	Computational Intelligence	PE	3	3	0	0	3	Programming knowledge, linear Algebra
7.	60 CS E37	Data Analytics	PE	3	3	0	0	3	Python Programming

Note: Any of the elective course can be opted for honour degree

SEMESTER VII, ELECTIVE IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 CS E41	Natural Language Processing	PE	3	3	0	0	3	Machine Learning, Python Programming

Rev. No.4/w.e.f. 01.06.2024
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Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	60 CS E42	Industrial Applications Development and Deployment Practices	PE	3	3	0	0	3	Software Engineering

3.	60 CS E43	Human Computer Interaction	PE	3	3	0	0	3	Machine Learning
4.	60 CS E44	Multicore Architecture and Programming	PE	3	3	0	0	3	Computer Architecture
5.	60 CS E45	Ethical Hacking	PE	3	3	0	0	3	Cryptography and Network Security
6.	60 CS E46	Big Data Frameworks	PE	3	3	0	0	3	Java, SQL, Linux
7.	60 CS E47	Advanced .NET	PE	3	3	0	0	3	C# and .NET
8.	60 CS E48	Cyber Security	PE	3	3	0	0	3	Computer Networks

Note: Any of the elective course can be opted for honour degree

SEMESTER VIII, ELECTIVE V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 CS E51	Social Network Analysis	PE	3	3	0	0	3	Mathematical Foundations, Statistics and Data Analysis, Computer Networks
2.	60 CS E52	Agile Methodology	PE	3	3	0	0	3	Software Engineering
3.	60 CS E53	Multimedia Computing	PE	3	3	0	0	3	Operating System
4.	60 CS E54	Advanced Algorithm and Design	PE	3	3	0	0	3	Data Structures and Algorithms

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.	60 CS E55	Information Security	PE	3	3	0	0	3	Cryptography and Network Security
6	60 CS E56	Computer Vision	PE	3	3	0	0	3	Linear Algebra, Data Structures

Note: Any of the elective course can be opted for honour degree INTEGRATED COURSES

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	61 EC 001	Digital Logic and Microprocessor	ES	4	2	0	2	3	Basic knowledge of Electrical and Electronics
2.	60 CS 301	Computer Networks	PC	5	3	0	2	4	NIL
3.	60 CS 403	Software Engineering	PC	4	2	0	2	3	NIL
4.	60 IT 003	Design Thinking	PC	4	2	0	2	3	Software Engineering
5.	60 CS 702	Deep Learning	PC	4	2	0	2	3	Probability, Statistics, Linear Algebra, Calculus and Machine Learning Techniques
6.	60 CS E11	Data Mining	PE	4	2	0	2	3	Linear Algebra, Statistics and programming
7.	60 CS E12	Node.js and React.js	PE	4	2	0	2	3	HTML, CSS, JavaScript
8.	60 CS E13	Mobile Application Development	PE	4	2	0	2	3	Java Programming
9.	60 CS E14	Information Retrieval Techniques	PE	4	2	0	2	3	Data Structures
10.	60 CS E15	Graph Theory	PE	4	2	0	2	3	Linear Algebra
11.	60 CS E22	Angular	PE	4	2	0	2	3	HTML, CSS, JavaScript
12.	60 CS E26	C# and .NET Core	PE	4	2	0	2	3	Object Oriented Programming
13.	60 CS E32	Full Stack Development	PE	4	2	0	2	3	Web Development

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

14.	60 CS E33	Salesforce	PE	4	2	0	2	3	Knowledge on Software Engineering and Computer Programming

SEMESTER VII &SEMESTER VIII, AUDIT COURSES (AC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 AC 001	Research Skill Development	AC	1	1	0	0	0	NIL

MANDATORY COURSES (MC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 MY 001	Environmental Studies and Climate Change	MC	2	2	0	0	0	NIL
2.	60 MY 002	Universal Human Values	MC	3	3	0	0	3	NIL
3.	60 MY 003	Startups and Entrepreneurship	MC	2	2	0	0	2	Basic knowledge of reading and writing in English

GENERAL ELECTIVE COURSES (GE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	61 GE 001	Heritage of Tamils / தமிழர் மரபு	GE	1	1	0	0	1	NIL

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	60 GE 002	Tamils and Technology	GE	1	1	0	0	1	NIL
		/ தமிழரும் தததொழில்நுட்பமும்							

OPEN ELECTIVES I / II / III / IV (OE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	61 CS L01	Object Oriented Programming	OE	4	2	0	2	3	NIL
2.	60 CS L02	AngularJS	OE	4	2	0	2	3	Basic knowledge of HTML, CSS, and JavaScript
3.	60 CS L03	C# and .NET Core	OE	4	2	0	2	3	Basic knowledge of HTML, Visual Studio, and Object Oriented Programming
4.	60 CS L04	Data Mining	OE	4	2	0	2	3	Basic understanding of Linear Algebra, Statistics and programming
5.	60 CS L05	Artificial Intelligence	OE	4	2	0	2	3	Knowledge on statistics, linear algebra, matrix, calculus, probability, programming languages and data modelling
6.	60 CS L06	Python Programming for Data Analytics	OE	4	2	0	2	3	Knowledge in basic mathematics, including algebra, calculus, and probability
7.	61 CS L07	Java Programming	OE	4	2	0	2	3	NIL

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

8.	60 CS L08	Linux and Shell Programming	OE	4	2	0	2	3	Knowledge on basic programming constructs
9.	60 CS L09	Salesforce	OE	4	2	0	2	3	Knowledge on Software Engineering and computer programming skills
10.	60 CS L10	Scripting Languages	OE	3	3	0	0	3	NIL
11.	60 CS L11	Advanced Java Programming	OE	3	3	0	0	3	Basics of Java
12.	60 CS L12	Generative AI	OE	3	3	0	0	3	Deep Learning
13.	60 CS L13	Industrial Cloud Practices	OE	3	3	0	0	3	Programming Skill, Computer Networks, DBMS

CAREER GUIDANCE COURSES (CGC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 CG 0P1	Career Skill Development – I	CG	2	0	0	2	1	Basic knowledge of reading and writing in English
2.	60 CG 0P2	Career Skill Development – II	CG	2	0	0	2	1	Basic knowledge of reading and writing in English

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.	60 CG 0P3	Career Skill Development – III	CG	2	0	0	2	1	Basic knowledge of Arithmetic and Logical Reasoning
4.	60 CG 0P4	Career Skill Development – IV	CG	2	0	0	2	1	Basic knowledge of Arithmetic and Logical Reasoning
5.	60 CG 0P5	Comprehension Test	CG	2	0	0	2	1	Career Skill Development – I,II,III,IV
6.	60 CS 6P3	Mini Project	CG	2	0	0	2	1	All Courses
7.	60 CS 7P2	Project Work Phase-I	CG	4	0	0	4	2	All Courses
8.	60 CS 8P1	Project Work Phase-II	CG	16	0	0	16	8	All Courses
9.	60 CG 0P6	Internship	CG	0	0	0	0	1/2/3	All Courses

K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215

(An Autonomous Institution affiliated to Anna University)

COURSES OF STUDY

(For the candidates admitted in 2024-2025)

SEMESTER I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.		Induction Programme	-	-	-	-	-	**0**
THEORY								

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	60 EN 001	Professional English – I	HS	3	1	0	2	2
3.	60 MA 001	Matrices and Calculus	BS	5	3	1	0	4
4.	60 EE 001	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3
5.	60 ME 002	Engineering Graphics	ES	6	2	0	4	4
6.	60 CS 001	C Programming	ES	3	3	0	0	3
7.	60 MY 001	Environmental Studies and Climate Change	MC	2	2	0	0	0
8.	61 GE 001	Heritage of Tamils / தமிழர் மரபு#	GE	1	1	0	0	1#
PRACTICALS								
9.	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2
10.	61 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2
			Total	**31**	**15**	**1**	**14**	**20**

* **NCC** - Course can be waived with 3 credits in VII semester or offered as extra credits
* **NSS/NSO/YRC/RRC/Fine Arts** – 3 credits is not accounted for CGPA
* Career Skill Development - additional credit is offered not accounted for CGPA
* Internship - 3 additional credits not accounted for CGPA is offered based on the Internship duration

Heritage of Tamils / தமிழர் மரபு# - additional 1 credit is offered and not account for CGPA

SEMESTER II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 EN 002	Professional English – II	HS	3	1	0	2	2
2.	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	BS	5	3	1	0	4
3.	60 PH 004	Physics for Computer Technology	BS	3	3	0	0	3
4.	60 CH 004	Engineering Chemistry	BS	3	3	0	0	3
5.	60 IT 001	Python Programming	PC	5	3	1	0	4
6.	60 GE 002	Tamils and Technology / தமிழரும் தததொழில்நுட்பமும்*	GE	1	1	0	0	1*
PRACTICALS								
7.	60 CP 0P2	Engineering Physics and Chemistry Laboratory	BS	4	0	0	4	2

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

8.	60 IT 0P1	Python Programming Laboratory	PC	4	0	0	4	2
9.	61 CS 2P1	Web Development	PC	2	0	0	2	1
10.	60 CG 0P1	Career Skill Development – I	CG	2	0	0	2	1*
			Total	**32**	**14**	**2**	**14**	**21**

* Tamils and Technology / தமிழரும் தததொழில்நுட்பமும்* – additional 1 credit is offered and not account for CGPA

SEMESTER III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 MA 010	Mathematical Statistics and Numerical Methods	BS	5	3	1	0	4
2.	60 CS 003	Data Structures	PC	3	3	0	0	3
3.	60 CS 004	Java Programming	PC	3	3	0	0	3
4.	61 EC 001	Digital Logic and Microprocessor	ES	4	2	0	2	3
5.	60 CS 301	Computer Networks	PC	5	3	0	2	4
6.	60 MY 002	Universal Human Values*	MC	3	3	0	0	3*
PRACTICALS								
7.	61 CS 0P3	Data Structures Laboratory	PC	4	0	0	4	2
8.	60 CS 0P4	Java Programming Laboratory	PC	4	0	0	4	2
9.	60 CG 0P2	Career Skill Development – II	CG	2	0	0	2	1*
10.	60 CG 0P6	Internship*	CG	-	-	-	-	1/2/3*
			Total	**33**	**17**	**1**	**14**	**21**

* Universal Human Values – additional 3 credit is offered and not accounted for CGPA

SEMESTER IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 MA 017	Discrete Mathematics	BS	5	3	1	0	4
2.	60 IT 002	Design and Analysis of Algorithms	PC	3	3	0	0	3
3.	61 CS 401	Advanced Web Development	PC	3	3	0	0	3
4.	61 CS 402	Database Management Systems	PC	3	3	0	0	3
5.	60 CS 403	Software Engineering	PC	4	2	0	2	3

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

6.	60 OE L0*	Open Elective–I	OE	3	3	0	0	3
PRACTICALS								
7.	61 CS 4P1	Advanced Web Development Laboratory	PC	4	0	0	4	2
8.	61 CS 4P2	Database Management Systems Laboratory	PC	4	0	0	4	2
9.	60 CG 0P3	Career Skill Development – III	CG	2	0	0	2	1*
10.	60 CG 0P6	Internship*	CG	-	-	-	-	1/2/3*
			Total	**31**	**17**	**1**	**12**	**23**

SEMESTER V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 CS 501	Artificial Intelligence	PC	3	3	0	0	3
2.	60 CS 502	Computer Architecture	PC	3	3	0	0	3
3.	60 CS 503	Operating Systems	PC	3	3	0	0	3
4.	60 CS 504	Formal Language and Automata Theory	PC	5	3	1	0	4
5.	60 IT 003	Design Thinking	PC	4	2	0	2	3
6.	60 CS E1*	Professional Elective –I	PE	4	2	0	2	3
7.	60 OE L0*	Open Elective-II	OE	3	3	0	0	3
PRACTICALS								
8.	60 CS 5P1	Artificial Intelligence Laboratory	PC	4	0	0	4	2
9.	60 CS 5P2	Operating Systems Laboratory	PC	4	0	0	4	2
10.	60 CG 0P4	Career Skill Development – IV	CG	2	0	0	2	1*
11.	60 CG 0P6	Internship*	CG	-	-	-	-	1/2/3*
			Total	**35**	**19**	**1**	**14**	**26**

SEMESTER VI

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 CS 601	Cryptography and Network Security	PC	3	3	0	0	3

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	60 CS 602	Principles of Compiler Design	PC	5	3	1	0	4
3.	60 CS 603	Data Science	PC	3	3	0	0	3
4.	60 CS E2*	Professional Elective–II	PE	3	3	0	0	3
5.	60 CS E3*	Professional Elective– III	PE	3	3	0	0	3
6.	60 OE L0*	Open Elective-III	OE	3	3	0	0	3
7.	60 MY 003	Startups and Entrepreneurship	MC	2	2	0	0	2$
PRACTICALS								
8.	60 CS 6P1	Cryptography and Network Security Laboratory	PC	4	0	0	4	2
9.	60 CS 6P2	Data Science Laboratory	PC	4	0	0	4	2
10.	60 CS 6P3	Mini Project	PC	2	0	0	2	1*
11.	60 CG 0P5	Comprehension Test	CG	2	0	0	2	1*
12.	60 CG 0P6	Internship*	CG	-	-	-	-	1/2/3*
			Total	**32**	**20**	**1**	**10**	**23**

* Comprehension Test – One additional credit is offered and not accounted for CGPA calculation

* Mini Project - additional 1 credit is offered and not accounted for CGPA

$ Startups and Entrepreneurship – additional 2 credit is offered and not accounted for CGPA

SEMESTER VII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 HS 002	Engineering Economics and Financial Accounting	HS	3	3	0	0	3
2.	60 CS 701	Cloud Computing	PC	3	3	0	0	3
3.	60 CS 702	Deep Learning	PC	4	2	0	2	3
4.	60 CS 703	Software Testing	PC	3	3	0	0	3
5.	60 CS E4*	Professional Elective– IV	PE	3	3	0	0	3
6.	60 AC 001	Research Skill Development	AC	1	1	0	0	0
7.	60 AB 00*	NCC/NSS/NSO/YRC/RRC/Fine Arts*	HS	4	2	0	2	3*
PRACTICALS								

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

8.	60 CS 7P1	Cloud Computing Laboratory	PC	4	0	0	4	2
9.	60 CS 7P2	Project Work Phase-I	CG	4	0	0	4	2
10.	60 CG 0P6	Internship *	CG	-	-	-	-	1/2/3*
			Total	25	**15**	**0**	**10**	**19**

* **NCC** - Course can be waived with 3 credits in VII semester or offered as extra credits *****
NSS/NSO/YRC/RRC/Fine Arts – 3 credits is not accounted for CGPA

SEMESTER VIII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 CS E5*	Professional Elective V	PE	3	3	0	0	3
PRACTICALS								
2	60 CS 8P1	Project Work Phase-II	CG	16	0	0	16	8
3	60 CG 0P6	Internship *	CG	-	-	-	-	1/2/3*
			Total	**19**	**3**	**0**	**16**	**11**

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE =164

BS : Basic Science
HS : Humanities and Social Science
ES : Engineering Science
PC : Professional Core
PE : Professional Elective
MC : Mandatory Course
CG : Career Guidance
L: Lecture
T: Tutorial P:
Practical
Note:

1 Hour Lecture is equivalent to 1 credit
2 Hour Tutorial is equivalent to 1 credit
2 Hours Practical is equivalent to 1 credit

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215. Namakkal-Dt.

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

MINOR DEGREE PROGRAMME – FULL STACK DEVELOPMENT

LIST OF COURSES

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 CS M01	Java Programming	PE	3	3	0	0	3
2.	60 CS M02	Front End Development	PE	3	3	0	0	3
3.	60 CS M03	Database Technology	PE	3	3	0	0	3
4.	60 CS M04	Node JS	PE	3	3	0	0	3
5.	60 CS M05	React JS	PE	3	3	0	0	3
6.	60 CS M06	Enterprise Integration	PE	3	3	0	0	3
				Total	18	0	0	18

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS
(For the candidates admitted in 2024-2025)

FIRST SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment *	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 EN 001	Professional English – I	2	40	60	100	45	100
2	60 MA 001	Matrices and Calculus	2	40	60	100	45	100
3	60 EE 001	Basic Electrical and Electronics Engineering	2	40	60	100	45	100
4	60 ME 002	Engineering Graphics	2	40	60	100	45	100
5	60 CS 001	C Programming	2	40	60	100	45	100
6	60 MY 001	Environmental Studies and Climate Change	2	100	-	100	-	100
7	61 GE 001	Heritage of Tamils / தமிழர் மரபு	2	40	60	100	45	100
PRACTICAL								
8	60 CS 0P1	C Programming Laboratory	2	60	40	100	45	100
9	61 ME 0P1	Fabrication and Reverse Engineering Laboratory	2	60	40	100	45	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
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CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination and 40 marks for practical End Semester Examination.

60 EN 001	PROFESSIONAL ENGLISH - I	Category	L	T	P	Credit
		HS	1	0	2	2

Objectives

- To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak effectively in English in real life and career related situations
- To equip students with effective speaking and listening skills in English
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively

Pre-requisites

 Basic knowledge of reading and writing in English

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compare and interpret complex academic texts	Understand
CO2	Recall the denotative and connotative meanings of technical texts	Remember
CO3	Interpret definitions, descriptions, narrations, and essays on various topics	Understand
CO4	Express fluently and accurately in formal and informal communicative contexts	Understand
CO5	Summarize their opinions effectively in both oral and written medium of communication	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	-	2	3	3	2	3	2	2	-
CO2	-	-	-	-	-	-	-	2	3	3	2	3	2	2	-
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	2	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	2	2	-

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO5	-	-	-	-	-	-	-	2	3	3	2	3	2	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	Test 1	Test 2	
	Theory	Theory	Theory
Remember	10	10	20
Understand	50	50	80
Apply	-	-	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 EN 001 – Professional English I							
Common to all Branches							
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
I	1	0	2	45	2	40	60	100

Introduction to Fundamentals of Communication* **Listening:** General information-specific details-conversation: introduction to classmates – audio / video (formal & informal). **Speaking:** Self Introduction; Introducing a friend; conversation - politeness strategies. **Reading:** Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. **Writing:** Writing letters – informal and formal – basics and format orientation **Language Focus:** Present Tenses; word formation (affixes); synonyms, antonyms and contranyms, and phrasal verbs; abbreviations & acronyms (as used in technical contexts).	[9]
Narration and Summation* **Listening:** Podcast, anecdotes / stories / event narration; documentaries and interviews with celebrities. **Speaking:** Narrating personal experiences / events; Interviewing a celebrity; reporting / and summarizing of documentaries / podcasts/ interviews. **Reading:** Biographies, travelogues, newspaper reports, excerpts from literature, and travel & technical blogs. **Writing:** Paragraph writing, short report on an event (field trip etc.). **Language Focus:** Past tenses and prepositions; One-word substitution.	[9]

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Description of a process / product* **Listening:** Listen to a product and process descriptions; advertisements about products or services **Speaking:** Picture description; giving instruction to use the product; presenting a product. **Reading:** Advertisements, gadget reviews and user manuals. **Writing:** Definitions; instructions; and product /process description. **Language Focus:** Imperatives; comparative adjectives; future tenses. Homonyms; and Homophones, discourse markers (connectives & sequence words)	[9]
Classification and Recommendations* **Listening:** TED Talks; scientific lectures; and educational videos. **Speaking:** Small Talk; Mini presentations **Reading:** Newspaper articles and Journal reports **Writing:** Note-making / Note-taking; recommendations; Transferring information from nonverbal (chart, graph etc, to verbal mode) **Language Focus:** Articles; Pronouns -Possessive & Relative pronouns; subject-verb agreement; collocations.	[9]
Expression* **Listening:** Debates/ discussions; different viewpoints on an issue; and panel discussions. **Speaking:** Group discussions, debates & role plays. **Reading:** Editorials; and opinion blogs. **Writing:** Essay Writing (Descriptive or narrative). **Language Focus:** Punctuation; Compound Nouns; simple, compound & complex sentences. cause & effect expressions.	[9]
Total Hours	**45**

Text Book(s):	
1.	'English for Engineers & Technologists' Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2.	Norman Lewis, 'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book', Penguin Random House India, 2020

Reference(s):	
1.	Paul Emmerson and Nick Hamilton, 'Five Minute Activities for Business English', Cambridge University Press, New York, 2005
2.	Arthur Brookes and Peter Grundy,' Beginning to Write: Writing Activities for Elementary and Intermediate Learners', Cambridge University Press, New York, 2003
3.	Michael McCarthy and Felicity O Dell, 'English Vocabulary in Use: Upper Intermediate', Cambridge University Press, N.York, 2012
4.	Lakshmi Narayanan, 'A Course Book on Technical English' Scitech Publications (India) Pvt. Ltd. 2020.

*SDG 4 – Quality Education

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of Hours**
1	**Introduction to Fundamentals of Communication**	
1.1	Listening for general information and Specific details	1
1.2	Self-introduction	1
1.3	Narrating personal experiences	1
1.4	Reading relevant to technical contexts and emails	1

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.5	Writing letters – informal	1
1.6	Writing letters - formal	1
1.7	Present Tenses	
1.8	synonyms, antonyms and contranyms, and affixes	1
1.9	phrasal verbs; abbreviations & acronyms	1
2	**Narration and Summation**	
2.1	Listening to podcasts, documentaries and interviews with celebrities	1
2.2	Narrating personal experiences	1
2.3	Summarizing of documentaries	1
2.4	Reading travelogues, and excerpts from literature	
2.5	Paragraph writing	1
2.6	Short report on an event (field trip etc.).	1
2.7	Past tenses	1
2.8	Prepositions	1
2.9	One-word substitution	1
3	**Description of a process / product**	
3.1	Listen to a product and process descriptions	1
3.2	Picture description	1
3.3	Giving instruction to use the product	1
3.4	Reading Advertisements, gadget reviews and user manuals	1
3.5	Writing Definitions and instructions	1
3.6	Future Tenses	1
3.7	Homonyms and Homophones	1
3.8	Imperatives	1
3.9	comparative adjectives, and discourse markers	1
4	**Classification and Recommendations**	
4.1	Listening to TED Talks and educational videos	2
4.2	Listening to scientific lectures	1
4.3	Small Talk and mini presentations	2
4.4	Reading newspaper articles and journal reports	2
4.5	Note-making / Note-taking	1
4.6	Recommendations	1
4.7	Transferring information from non-verbal	1
4.8	Articles and Pronouns	2
4.9	Subject-verb agreement and collocations	1
5	**Expression**	
5.1	Listening to debates and panel discussions	1
5.2	Group discussions	2

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.3	Role plays	1
5.4	Reading editorials and opinion blogs	1
5.5	Essay Writing (Descriptive or narrative)	1
5.6	Punctuation and cause & effect expressions.	1
5.7	Compound Nouns	1
5.8	Simple, compound & complex sentences	1

Course Designer(s)

1. Dr.A.Palaniappan- palaniappan@ksrct.ac.in

60 MA 001	MATRICES AND CALCULUS	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To familiarize the basic concepts in Cayley-Hamilton theorem and orthogonal transformation
- To get exposed to the fundamentals of differentiation
- To acquire skills to understand the concepts involved in Jacobians and maxima and minima
- To solve various linear differential equations and method of variation of parameters To learn various techniques and methods in solving definite and indefinite integrals

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply the concepts of Cayley-hamilton theorem and orthogonal transformation to the matrix	Apply
CO2	Apply the concepts of differentiation in solving various Engineering problems	Apply
CO3	Obtain Jacobians and maxima and minima of functions of two variables	Apply
CO4	Employ various methods in solving differential equations	Apply
CO5	Apply different techniques to evaluate definite and indefinite integrals	Apply

Mapping with Programme Outcomes

COs	POs	PSOs

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	40	40	70
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 MA 001- MATRICES AND CALCULUS

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	1	0	60	4	40	60	100

Matrices Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors – Cayley-Hamilton theorem – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by an Orthogonal transformation – Nature of quadratic form – Applications: Stretching of an elastic membrane. **Hands-on:** Matrix Operations - Addition, Multiplication, Transpose, Inverse and Rank	[9]

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Differentiation Representation of functions – Limit of a function – Continuity – Derivatives – Differentiation rules (sum, product, quotient, chain rules) – Successive Differentiation – Leibnitz's theorem – **Applications: Maxima and Minima of functions of one variable. * Hands-on:** Determine the solution of system of linear equations	[9]
Functions of Several Variables Partial differentiation – Homogeneous functions and Euler's theorem – Jacobians – Taylor's series for functions of two variables – **Applications: Maxima and minima of functions of two variables – Constrained maxima and minima: Lagrange's Method of Undetermined Multipliers.* Handson:** Compute the Eigen values and Eigen vectors of a Matrix	[9]
Differential Equations Linear differential equations of second and higher order with constant coefficients – R.H.S is of the form $e^{\alpha x}, sin\ \alpha\ x, cos\ \alpha\ x, x^n, n > 0$ – Differential equations with variable coefficients: Cauchy's and Legendre's form of linear equations – Method of variation of parameters. **Handson:** Solve the first and second order ordinary differential equations	[9]
Integration Definite and Indefinite integrals – Substitution rule – Techniques of Integration: Integration by parts, Integration of rational functions by partial fraction, Integration of irrational functions – Improper integrals – Applications: Hydrostatic force and pressure, moments and centres of mass. **Hands-on:** Compute the Maxima and Minima of a function of one variable	[9]
Total Hours:45+15(Tutorial)	**60**

Text Book(s):	
1.	Grewal B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi, 2017.
2.	Kreyszig Erwin, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Limited, New Delhi, 2016.

Reference(s):	
1.	Dass H.K, "Higher Engineering Mathematics", 3rd (Revised) Edition, S.Chand & Company Ltd, New Delhi, 2014.
2.	Veerarajan T, "Engineering Mathematics", for Semesters I & II, 1st Edition, Tata McGraw Hill Publishing Co., New Delhi, 2019.
3.	Kandasamy P, Thilagavathy K and Gunavathy K, "Engineering Mathematics - I", S.Chand & Company Ltd, New Delhi, 2017.
4.	Bali N P and Manish Goyal," A text book of Engineering Mathematics",10th Edition, Laxmi Publications (P) Ltd, 2016.

*SDG 4 – Quality Education **Course Contents and Lecture Schedule**

S.No.	Topic	No. of Hours
1.	**Matrices**	
1.1	Characteristic equation	1
1.2	Eigen values and Eigen vectors of a real matrix	1
1.3	Properties of Eigen values and Eigen vectors	1
1.4	Cayley-Hamilton theorem	1

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.5	Orthogonal transformation of a symmetric matrix to diagonal form	1
1.6	Nature of quadratic form	1
1.7	Reduction of quadratic form to canonical form by Orthogonal transformation	2
1.8	Stretching of an elastic membrane	1
1.9	Tutorial	2
1.10	Hands-on	1
2.	**Differentiation**	
2.1	Representation of functions	1
2.2	Limit of a function and Continuity	1
2.3	Differentiation rules (sum, product, quotient, chain rules)	2
2.4	Successive differentiation	1
2.5	Leibnitz's theorem	2
2.6	Maxima and minima of functions of one variable	2
2.7	Tutorial	2
2.8	Hands-on	1
3.	**Functions of Several Variables**	
3.1	Partial differentiation	1
3.2	Homogeneous functions and Euler's theorem	1
3.3	Jacobians	2
3.4	Taylor's series for functions of two variables	1
3.5	Maxima and minima of functions of two variables	2
3.6	Lagrange's Method of Undetermined Multipliers	2
3.7	Tutorial	2
3.8	Hands-on	1
4.	**Differential Equations**	
4.1	Linear differential equations of second and higher order with constant co-efficient	1
4.2	R.H.S is of the form $e^{\alpha x}, sin\ \alpha\ x, cos\ \alpha\ x, x^n, n > 0$	2
	Differential equations with variable coefficients: Cauchy's form of linear equations	2
4.3 4.4	Differential equations with variable coefficients: Legendre's form of linear equations	2
4.5	Method of variation of parameters	2
4.6	Tutorial	2
4.7	Hands-on	1
5.	**Integration**	
5.1	Definite and Indefinite integrals	2
5.2	Substitution rule	1
5.3	Techniques of Integration: Integration by parts	1

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.4	Integration of rational functions by partial fraction	1
5.5	Integration of irrational functions	1
5.6	Improper integrals	1
5.7	Hydrostatic force.	1
5.8	Pressure, moments and centres of mass.	1
5.9	Tutorial	2
5.10	Hands-on	1
	Total	60

Course Designers

1. Dr.C.Chandran - cchandran@ksrct.ac.in
2. Mr.G.Mohan - mohang@ksrct.ac.in

60 EE 001	Basic Electrical and Electronics Engineering	Category	L	T	P	Credit
		ES	3	0	0	3

Objectives

- To familiarize the basic concept on electrical circuits and its various parameters
- To facilitate the various types of electrical machines and their uses
- To gain knowledge on Electrical safety
- To provide exposure on the functions of various semiconductor devices
- To familiarize the use of various measuring instruments

Pre-requisites

NIL

Course Outcomes

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

On the successful completion of the course, students will be able to

CO1	Apply the basic laws of electric circuits to calculate the unknown quantities	Apply
CO2	Acquire knowledge on different electrical machines and select suitable machines for industrial applications.	Analyze
CO3	Recognize the significance of various components of low voltage electrical installations and create awareness on electrical safety.	Understand
CO4	Realize the operation and characteristics of semiconductor devices.	Analyze
CO5	Understand the operating principles of measuring instruments and choose suitable instrument for measuring the parameters.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	2	-	-	-	-	2	3	-	3	2	-
CO2	3	3	1	1	-	-	2	-	2	-	2	1	3	2	-
CO3	3	3	-	2	-	2	-	-	-	-	2	2	3	2	-
CO4	2	2	3	-	2	-	2	1	-	2	1	3	3	2	-
CO5	2	3	1	2	-	-	3	2	-	-	2	3	3	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 EE 001 – Basic Electrical and Electronics Engineering								
Common to CSE, IT, AIDS, AIML, MECH, MCT, BT, FT and CIVIL Branches								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

ELECTRICAL CIRCUITS DC Circuits: Circuit Components: Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws – Simple problems. Introduction to AC Circuits and Parameters: Waveforms, Average value and RMS Value of Sinusoidal Waveform real power, reactive power and apparent power, power factor – Steady state analysis of RLC series circuits- Simple problems. Introduction to three phase AC circuits.	[10]
ELECTRICAL MACHINES* Construction and Working principle - Separately and Self excited DC Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.	[10]
ELECTRICAL INSTALLATIONS* Domestic wiring, types of wires and cables, earthing, protective devices - switch fuse unit - Miniature Circuit Breaker - Moulded Case Circuit Breaker - Earth Leakage Circuit Breaker, Batteries and types, UPS, Safety precautions and First Aid.	[9]
ANALOG ELECTRONICS Introduction to Semiconductor Materials – PN Junction Diodes, Zener Diode – Characteristics and Applications – Bipolar Junction Transistor - Biasing and Configuration (NPN) - **Regulated power supply unit, switched mode power supply*.**	[8]
MEASUREMENTS AND INSTRUMENTATION Functional elements of an instrument, Standards and calibration, Operating Principle, types - Moving Coil and Moving Iron meters, Operating principles and Types of Wattmeter, Energy Meter, Instrument Transformers - **CT and PT, DSO - Block diagram - Data acquisition*.**	[8]
Total Hours:	**45**

Text Book(s):

1.	Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020.
2.	A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.

Reference(s):

1.	Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019.
2.	Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017.
3.	Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.	H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

*SDG:9 - Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**ELECTRICAL CIRCUITS**	
1.1	Circuit Components: Resistor, Inductor, Capacitor	1
1.2	Ohm's Law - Kirchhoff's Laws	1
1.3	Ohm's Law - Kirchhoff's Laws - Problems	2
1.4	Introduction to AC Circuits and Parameters: Waveforms, Average value and RMS Value of Sinusoidal Waveform	2
1.5	Real power, reactive power and apparent power, power factor	1
1.6	Steady state analysis of RLC series circuits	1
1.7	RLC series circuits - Problems	1
1.8	Introduction to three phase system	1
2	**ELECTRICAL MACHINES**	
2.1	Construction and Working principle of DC Generator	1
2.2	Types and Applications of Separately and Self excited DC Generators	1
2.3	EMF equation of DC Generator	1
2.4	Working Principle of DC motors	1
2.5	Torque Equation	1
2.6	Types and Applications	1
2.7	Construction, Working principle and Applications of Transformer	1
2.8	Construction, Working principle and Applications of Three phase Alternator	1
2.9	Construction, Working principle and Applications of Synchronous motor	1
2.10	Construction, Working principle and Applications of Three Phase Induction Motor	1
3	**ELECTRICAL INSTALLATIONS**	
3.1	Domestic wiring, types of wires and cables	1
3.2	Earthing, protective devices	2
3.3	Switch fuse unit - Miniature Circuit Breaker	1
3.4	Molded Case Circuit Breaker - Earth Leakage Circuit Breaker	1
3.5	Batteries and types	2

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.6	UPS	1
3.7	Safety precautions and First Aid	1
4	**ANALOG ELECTRONICS**	
4.1	Introduction to Semiconductor Materials	1
4.2	Characteristics and Applications of PN Junction Diodes	1
4.3	Characteristics and Applications of Zener Diode	1
4.4	Bipolar Junction Transistor	1
4.5	Biasing & Configuration (NPN)	2
4.6	Regulated power supply unit	1
4.7	Switched mode power supply	1
5	**MEASUREMENTS AND INSTRUMENTATION**	
5.1	Functional elements of an instrument	1
5.2	Standards and calibration	1
5.3	Moving Coil meters - Operating Principle, types	1
5.4	Moving Iron meters - Operating Principle, types	1
5.5	Operating principles and Types of Wattmeter	1
5.6	Energy Meter	1
5.7	Instrument Transformers – CT & PT	1
5.9	DSO - Block diagram - Data acquisition	1

Course Designer(s)

1.Mr.S.Srinivasan- srinivasan@ksrct.ac.in
2.Ms.R.Radhamani- radhamani@ksrct.ac.in
3.Ms.S.Jaividhya- jaividhya@ksrct.ac.in
4.Dr.S.Gomathi-gomathi@ksrct.ac.in
5.Mr.T.Prabhu - prabhut@ksrct.ac.in

60 ME 002	Engineering Graphics	Category	L	T	P	Credit

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

		ES	2	0	4	4

Objectives

- To acquire various concepts of dimensioning, conventions and standards
- To impart the graphic skills for converting pictorial views of solids in to orthographic views.
- To learn the concept in projection of solids, section of solids and development of different types of surfaces.
- To learn the concept of isometric projection.
- To learn the geometry and topology of engineered components

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Demonstrate the Impact of computer technologies on graphical communication.	Apply
CO2	Convert the pictorial views in to orthographic views using drafting software.	Apply
CO3	Draw the projection of simple solids, true shape of sections and development of surfaces.	Apply
CO4	Construct the isometric projections of objects using drafting software.	Apply
CO5	Interpret a design project illustrating engineering graphical skills.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	2	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	2	3	-
CO3	3	3	3	-	3	-	-	3	-	-	-	-	2	3	-
CO4	3	3	3	-	3	-	-	3	-	-	-	-	2	3	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	2	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 ME 002 – Engineering Graphics								
Common to CSE, IT, AIDS, AIML, MECH, MCT, BT, FT and CIVIL Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	2	0	4	90	4	40	60	100

Introduction to Computer Aided Drafting (CAD) software* Theory of CAD software – Menu System, Tool bars (Standard, Object Properties, Draw, Modify and Dimension) – Drawing Area (Background, Crosshairs, Coordinate System) – Dialog boxes and windows – Shortcut menus (Button Bars) – The Command Line and Status Bar – Different methods of zoom – Select and erase objects.	[6+12]
Orthographic Projection* Theory of projection – Terminology and Methods of projection – first angle and third angle projection – Conversion of pictorial views into orthographic views	[6+12]
Projection of Solids and Sections of Solids* Projections of simple solids: prism, pyramid, cylinder and cone (Axis parallel to one plane and perpendicular to other, axis inclined to one plane and parallel to other). Sections of simple solids: prism, pyramid, cylinder and cone in simple positions (cutting plane is inclined to one of the principal planes and perpendicular to the other) – True shape of sections. **Development of Surfaces*** Principle of development-Methods of development: Parallel line development-Cube, Prism and Cylinder. Radial line development – Pyramid and cone	[6+12]
Isometric Projection Principles of Isometric projection – Isometric scale, Isometric views, Conventions – Isometric views of lines, Planes, Simple and compound Solids – Conversion of Orthographic views in to Isometric view.	[6+12]

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Application of Engineering Graphics* Geometry and topology of engineered components: Creation of engineering models and their presentation in standard 2D blueprint form, 3D wire-frame and shaded solids – Geometric dimensioning and Tolerance – Use of solid modeling software for creating associative models – Floor plans: windows, doors, and fixtures such as water closet (WC), bath sink, shower, etc. – Applying colour coding according to building drawing practice – Drawing sectional elevation showing foundation to ceiling – Introduction to Building Information Modelling (BIM).	[6+12]
Total Hours:	**90**

Text Book(s):	
1.	Bhatt N.D., “Engineering Drawing”, Charotar Publishing House Pvt. Ltd., 53rd Edition, Gujarat, 2019.
2.	Venugopal K., “Engineering Graphics”, New Age International (P) Limited, 2014.

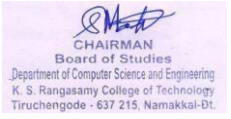
Reference(s):	
1.	Shah M.B., Rana B.C., and V.K.Jadon., “Engineering Drawing”, Pearson Education, 2011.
2.	Natarajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2014.
3.	Basant Agarwal and C.M.Agarwal., “Engineering Drawing”, McGraw Hill Education, 2013.
4.	Dhawan, R.K., “A Text Book of Engineering Drawing” 3 rd Revised Edition, S. Chand Publishing, New Delhi, 2012.

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Introduction to Computer Aided Drafting (CAD) software**	
1.1	Theory of CAD software	1
1.2	Menu System, Tool bars (Standard, Object Properties, Draw, Modify and Dimension)	4
1.3	Drawing Area (Background, Crosshairs, Coordinate System)	4
1.4	Dialog boxes and windows – Shortcut menus	4
1.5	The Command Line and Status Bar	1
1.6	Different methods of zoom – Select and erase objects.	4
2	**Orthographic Projection**	
2.1	Introduction to orthographic projections	2
2.2	Planes of projection	2
2.3	Projection of points	2
2.4	Projection of lines inclined to both planes	2
2.5	Projection of planes	2
2.6	Projection of planes Inclined to both planes	2
2.7	Conversions of pictorial views to orthographic views.	2
2.8	Practice class for pictorial views to orthographic views.	2

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024



2.9	Practice class for pictorial views to orthographic views.	2
3	**Projection of Solids, Sections of solids and Development of surfaces**	
3.1	Projections of simple solids: prism	1
3.2	Projections of simple solids: cylinder	1
3.3	Projections of simple solids: pyramid	1
3.4	Projections of simple solids: Cone	1
3.5	Practice class for Projection of Solids	1
3.6	Axis of solid inclined to both HP and VP	2
3.7	Section of solids for Prism,	1
3.8	Section of solids for Cylinder,	1
3.9	Section of solids for Pyramid,	1
3.10	Section of solids for Cone	1
3.11	Auxiliary Views - Draw the sectional orthographic views of geometrical solids.	2
3.12	Draw the sectional orthographic views of objects from industry.	1
3.13	Development of surfaces of Right solids Prism,	1
3.14	Development of surfaces of Right solids Pyramid	1
3.15	Development of surfaces of Right solids Cylinder and Cone	2
4	**Isometric Projection and Introduction to AutoCAD**	
4.1	Principles of isometric projection	2
4.2	Isometric scale	2
4.3	Isometric projections of simple solids: Prism,	2
4.4	Isometric projections of simple solids: Pyramid,	2
4.5	Isometric projections of simple solids: Cylinder	2
4.6	Isometric projections of simple solids: Cone	2
4.7	Isometric projections of frustum	2
4.8	Isometric projections of truncated solids	2
4.9	Combination of two solid objects in simple vertical positions.	2
5	**Application of Engineering Graphics**	
5.1	Geometry and topology of engineered components:	2
5.2	Creation of engineering models and their presentation in standard 2D blueprint form,	2
5.3	3D wire-frame and shaded solids – Geometric dimensioning and Tolerance – Use of solid modeling software for creating associative models	4
5.4	Floor plans: windows, doors, and fixtures such as water closet (WC), bath sink, shower, etc.	2
5.5	Applying colour coding according to building drawing practice	2
5.6	Drawing sectional elevation showing foundation to ceiling	4

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.7	Introduction to Building Information Modelling (BIM).	2

Course Designers

1. Dr.K.Mohan- mohank@ksrct.ac.in

60 CS 001	C PROGRAMMING	Category	L	T	P	Credit
		ES	3	0	0	3

Objectives

- To learn most fundamental element of the C language and to examine the execution of branching, looping statements,
- To examine the concepts of arrays, its characteristics and types and strings.
- To understand the concept of functions, pointers and the techniques of putting them to use
- To apply the knowledge of structures and unions to solve basic problems in C language
- To enhance the knowledge in file handling functions for storage and retrieval of data

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Construct the fundamental building blocks of structured Programming in C	Apply
CO2	Implement the different operations on arrays and strings	Apply
CO3	Develop simple real world applications utilizing functions, recursion and pointers.	Apply
CO4	Demonstrate the concepts of structures ,unions ,user defined data types and preprocessor	Apply
CO5	Interpret the file concepts using proper standard library functions for a given application	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO2	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO3	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO4	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO5	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	40	40	60
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. – Computer Science and Engineering

60 CS 001 – C Programming

Common to all Branches

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Basics of C, I/O, Branching and Loops* Structure of a C Program – Data types – Keywords - Variables – Type Qualifiers - Constants – Operators–expressions and precedence- Console I/O– Unformatted and Formatted Console I/O - Conditional Branching and Loops-Writing and evaluation of conditionals and consequent branching	[9]
Arrays and Strings* Arrays: One Dimensional Arrays - Two Dimensional Arrays – Matrix Manipulation - Character arrays – Strings: String Manipulation with and without String Handling Functions.	[7]
Functions and Pointers* Functions: Scope of a Function – Library Functions and User defined functions - Function Prototypes – Call by value and Call by reference – Function Categorization- Arguments to main function—Recursion and application - Passing Arrays to Functions– Storage class Specifiers. Introduction to Pointer Variables - The Pointer Operators - Pointer Expressions - Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers– Function and pointers - Dynamic memory allocation.	[11]

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Structures, Unions, Enumerations, Typedef and Preprocessors* Structures - Introduction to Structures and Initialization - Arrays of Structures- Arrays and Structures, Nested Structures - Passing Structures to Functions - Structure Pointers - Unions – Bit Fields - Enumerations - typedef –The preprocessor and commands.	[9]
File Handling* File: Streams –Reading and Writing Characters - Reading and Writing Strings - File System functions – File Manipulation-Sequential access - Random Access Files – Command Line arguments.	[9]
Total Hours:	**45**
Text Book(s):	
1.	Herbert Schildt, “The Complete Reference C”, Fourth Edition, Tata McGraw Hill Edition, 2010.
2.	Byron Gottfried, “Programming with C”, Third Edition, McGraw Hill Education, 2014.
Reference(s):	
1.	Balagurusamy E, “Programming in ANSI C”, Seventh Edition, Tata McGraw Hill Edition, New Delhi, 2016.
2.	Brian W. Kernighan and Dennis M. Ritchie, “C Programming Language”, Prentice-Hall.
3.	ReemaThareja, “Computer Fundamentals and Programming in C”, Second Edition, Oxford Higher Education, 2016.
4.	King K N, “C Programming: A Modern Approach”, Second Edition, W.W.Norton, New York, 2008.

*SDG:4- Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Basics of C, I/O, Branching and Loops**	
1.1	Structure of a C Program, Keywords	1
1.2	Data types, Type Qualifiers	1
1.3	Variables and Constants	1
1.4	Operators–expressions and precedence	1
1.5	Console I/O– Unformatted and Formatted Console I/O	1
1.6	Conditional Branching	1
1.7	Iteration and loops	2
1.8	Writing and evaluation of conditionals and consequent branching	1
2	**Arrays and Strings**	
2.1	One Dimensional Array	1
2.2	Two-Dimensional Array and Matrix Manipulation	1
2.3	Character arrays and Strings Basics	1
2.4	String Manipulation without String Handling Functions	2

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.5	String Manipulation with String Handling Functions	2
3	**Functions and Pointers**	
3.1	Scope of a Function – Library Functions, User defined functions and Function Prototypes	1
3.2	Function Call by value and Function Call by reference, Function Categorization	2
3.3	Arguments to main function	1
3.4	Recursion and application	1
3.5	Passing Arrays to Functions	1
3.6	Storage class Specifiers	1
3.7	Introduction to Pointer Variables - The Pointer Operators - Pointer Expressions	1
3.8	Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers	1
3.9	Function and pointers	1
3.10	Dynamic memory allocation	1
4	**Structures, Unions, Enumerations, Typedef and Preprocessors**	
4.1	Introduction to Structures and Initialization	1
4.2	Arrays and Structures, Arrays of Structures	1
4.3	Structures within Structures, Passing Structures to Functions	2
4.4	Structure Pointers	1
4.5	Unions and Bit Fields.	1
4.6	Enumerations - typedef	1
4.7	Preprocessor commands	2
5	**File Handling**	
5.1	File Streams –Reading and Writing Characters - Reading and Writing Strings	2
5.2	File System functions and File Manipulation	2
5.3	Sequential access	2
5.4	Random Access Files	2
5.5	Command Line arguments and files	1

Course Designers

1. Dr.P.Kaladevi- kaladevi@ksrct.ac.in

60 MY 001	Environmental Studies and Climate Change	Category	L	T	P	Credit
		MC	2	0	0	0

Objectives

- To understand the impact climate changes in ecosystem and biodiversity.
- To analyze the impacts of pollution, control and legislation.
- To explain the importance of sustainable development practices.
- To explore the significance of organic farming.
- To identify the Geo-spatial tools for resource management.

Pre-requisites

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Interpret the impacts of pollution on climate change	Understand
CO2	Categorize the wastes and its management.	Analyze
CO3	Identify the different types of sustainable practices	Apply
CO4	Classify the organic farming techniques	Apply
CO5	Categorize the Geo-spatial tools for resource management	Analyze

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	-	-	3	-	-	-	-	2	-	-	-
CO2	3	2	-	-	-	3	3	2	-	-	-	2	-	-	-
CO3	3	2	-	-	-	3	3	2	-	-	-	2	-	-	-
CO4	3	2	-	-	-	2	3	-	-	-	-	2	-	-	-
CO5	3	2	-	-	3	-	2	-	-	-	-	2	-	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (30 Marks)		

	Case Study	Activity Report	**Quiz (20 marks)**		**Seminar presentation (50 marks)**
Remember	10	10	5	5	10
Understand	30	20	10	10	15
Apply	-	30	-	5	15
Analyse	20	-	5	-	10
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	60	60	20	20	50

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E. – Computer Science and Engineering							
60 MY 001 – Environmental Studies and Climate Change							
Common to all branches							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
I	2	0	0	30	0	100	-	100

Pollution and its Impact on Climate Change* Pollution: Sources and Impacts of Air Pollution – Greenhouse Effect- Global Warming- Climate Change - Ozone Layer Depletion - Acid Rain. Carbon Footprint - Climate Change on Various Sectors – Agriculture, Forestry and Ecosystem – Climate Change Mitigation and Adaptation. Action Plan on Climate Change. IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol on Climatic Changes.	[6]
Integrated Waste Management** Waste - Types a nd Classification. Principles o f Waste Management (5R Approach) - Swachh Bharat Abhiyan – Commercial Waste, Plastic Waste, Domestic Waste, EWaste - Biomedical Waste - Risk Management: Collection, Segregation, Treatment and Disposal Methods. Waste Water Treatment- Activate Sludge Process.	[6]
Sustainable Development Practices*** Sustainable Development Goals (Sdgs) **–** Green Computing- Carbon Trading - Green Building – Eco- Friendly Plastic – Alternate Energy: Hydrogen – Bio-Fuels – Solar Energy – Wind – Hydroelectric Power. Water Scarcity- Watershed Management, Ground Water Recharge and Rainwater Harvesting.	[6]
Environment and Agriculture**** Organic Farming – Bio-Pesticides- Composting, Bio Composting, Vermi- Composting, Roof Gardening and Irrigation. Waste Land Reclamation. Climate Resilient Agriculture. Green Auditing	[6]
Geo-Science in Natural Resource Management Data Base Software in Environment Information- Digital Image Processing Applications in Forecasting. GPS - Remote Sensing and Geographical Information System (GIS) - World Wide Web (Www) - Environmental Information System (ENVIS).	[6]
Total Hours:	**30**

Text Book(s):	
1.	Anubha Kaushik, Kaushik C P, „Perspectives in Environmental Studies”, New Age International publishers, 6th Edition 2018.
Reference(s):	
1.	G.Tyler Miller Environmental Science 14th Edition Cengage Publications, Delhi, 2013

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	Gilbert M.Masters and Wendell P. Ela,"Environmental Engineering And Science", PHI Learning Private Limited, 3rd Edition, 2015
3.	Erach Bharucha. Textbook of Environmental Studies for Undergraduate Courses, Universities Press, 2000

*SDG: 13 – Climate Action

**SDG: 4 – Clean Water and Sanitation

***SDG: 6 - Affordable and Clean Energy

****SDG: 3 – Good Health and Well-being

Course Contents and Lecture Schedule

S.No	Topic	No. of hours
1.0	**Pollution and its impact on climate change**	
1.1	Pollution: Sources and impacts of air pollution – greenhouse effect- Global warming- climate change - ozone layer depletion - acid rain	2
1.2	Climate change on various sectors: Agriculture, forestry and ecosystem. – climate change mitigation and adaptation	2
1.3	Action plan on climate change - IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol on Climatic Changes	2
2.0	**Integrated Waste Management**	
2.1	Waste - Types and classification. Principles of waste management (5R approach) - Swachh Bharat Abhiyan	2
2.2	Commercial waste, plastic waste, domestic waste, e-waste and biomedical waste	2
2.3	Risk management: Collection, segregation, treatment and disposal methods.	2
3.0	**Sustainable development practices**	
3.1	Sustainable development goals (SDGs) **–** Green computing- Carbon trading Green building – Eco- friendly plastic	2
3.2	Alternate energy: Hydrogen – Bio-fuels – Solar energy – Wind – Hydroelectric power	2
3.3	Water scarcity- Watershed management, ground water recharge and rainwater harvesting	2
4.0	**Environment and Agriculture**	
4.1	Organic farming – bio-pesticides	1
4.2	Composting, bio composting, vermi-composting	2
4.3	Roof gardening and irrigation	1
4.4	Waste land reclamation. Climate resilient agriculture, Green auditing	2
5.0	**Geo-science in natural resource management**	
5.1	Data base software in environment information, Digital image processing applications in forecasting	2
5.2	GPS, Remote Sensing and Geographical Information System (GIS)	2

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.3	World wide web (www), Environmental information system (ENVIS)	2
	Total	30

Course Designer(s)

1. Dr.T.A.Sukantha - sukantha@ksrct.ac.in 2. Dr.B.Srividhya - srividhya@ksrct.ac.in
3. Dr.S.Meenachi - meenachi@ksrct.ac.in
4. Ms.D.Kirthiga - kiruthiga@ksrct.ac.in

61 GE 001	**Heritage of Tamils** (Common to all Branches)	**Category**	**L**	**T**	**P**	**Credit**
		GE	1	0	0	1#

Objectives

- To learn the extensive literature of classical Tamil.
- To review the fine arts heritage of Tamil culture.
- To realize the contribution of Tamils in Indian freedom struggle.

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recognize the extensive literature of Tamil and its classical nature.	Understand
CO2	Apprehend the heritage of sculpture, painting and musical instruments of ancient people.	Understand
CO3	Review on folk and martial arts of Tamil people.	Understand
CO4	Insight thinai concepts, trade and victory of Chozha dynasty.	Understand

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO5	Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine.	Understand

Mapping with Programme Outcomes

COs	POs												PSO s		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Test (Marks)	End Sem Examination (Marks)
Remember	34	34
Understand	66	66
Apply	-	-
Analyse	-	-
Evaluate	-	-
Create	-	-
Total	100	100

Syllabus

K.S.Rangasamy College of Technology - Autonomous R2022

61 GE 001- Heritage of Tamils (Common to all Departments)

Hours/W eek Credit Maximum Marks

Semester Total hrs

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

	L	T	P		C	CA	ES	Total
I	1	0	0	15	1#	40	60	100

Language, Literature, Life Skills & Ethics*

Language Families in India - Dravidian Languages - Tamil as a Classical Language - Classical Literature in Tamil - Secular Nature of Sangam Literature - Distributive Justice in Sangam Literature - Management [3] Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan - Life, Responsibility, Self-exploration, Attitude, Selfconfidence, Goals, Relationships, Leadership, Gender equality

Heritage - Rock Art Paintings to Modern Art – Sculpture*

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical [3] instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

Folk and Martial Arts*

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, [3] Valari, Tiger dance - Sports and Games of Tamils.

Thinai Concept of Tamils*

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of [3] Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

Contribution of Tamils to Indian National Movement and Indian Culture*

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of [3] India - Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine - Inscriptions & Manuscripts - Print History of Tamil Books.

Total Hours 15 **Text Book(s) cum Reference Book(s)**

முனைவர் கே. கே. பிள்ளை, தமிகழ வரலொறு - கம்க ளும் பண் பொடும், தமிழ்நொடு பொடநூல்

1. மற்றும் க ல்வியியல் பணிக ள் க கழம், 18th Ed ,2022.
2. முனைவர் இல. சுந்தரம், க ணின ித்தமிழ்,விக னட் பிரசுரம், 2nd Ed 2021 முனைவர் இரொ.சிவொன ந்தம், மு.கேனர், கீழடி - ைவகை நதிக க்ைரயில் க ங்க க ொல கநர
3. நொக ரிக ம், ததொல்லியல் துைற தவளியீடு, 6th Ed ,2020.
முனைவர் இரொ.சிவொன ந்தம் , முனைவர் தத.பொஸ் க ர், தபொருைந - ஆற்றங்க ைர நொக ரிக ம்,
4. st Ed ,2022 ததொல்லியல் துைற தவளியீடு,1
5. ஈரதரொடு ேதிர், உயரத் ல் உரிைம, சிேஸ் ப்ளஸ் ஞ் டத்ரயிைிங் அதொடமி,1st Ed, 2024
6. Dr.K.K.Pillay, Social Life of Tamils, TNTB & ESC and RMRL – (In print).
7. Dr.S.Singaravel, Social Life of the Tamils - The Classical Period, International Institute of Tamil Studies, 1st, 2001. Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu, Historical Heritage of the Tamils, International Institute of
8. Tamil Studies, 2nd, 2010

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

9. Dr.M.Valarmathi, The Contributions of the Tamils to Indian Culture, International Institute of Tamil Studies

10. Dr.R.Sivanantham, Keeladi - Sangam City Civilization on the banks of river Vaigai, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation

11. Dr.K.K.Pillay, Studies in the History of India with Special Reference to Tamil Nadu, K.K. Pillay(Published by the Author

12. Dr.R.Sivanantham, Dr.J.Baskar, Porunai Civilization, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation.

13. R.Balakrishnan, Journey of Civilization Indus to Vaigai, Roja Muthiah Research Library,3rd Ed, 2022

*SDG 4 - Quality Education

For Heritage of Tamils, additional 1 credit is offered and not accounted for CGPA.

61 GE 001	தமிழர் மரபு (அைதைத் துனைேளுேக்கும் ததபொதுதவொைது)	Category	L	T	P	Credit
		GE	1	0	0	1#

தபொடத்திைர த ொேேங்ேள்

- தமிழ் தமொழியின ் இகல்க கண் கதறிைகவ் க ற்றுணரத் ல்.
- தமிழர் பண் பொட்டின ் நுண் க ைகலள் பற்றிய ஒரு மீள்பொரைர்வ.
- இந்திய சுதந்திரப் ேபொரொட்டத்தில் தமிழகர் ளின ் பங்க ளிப்ைப உணருதல் .

Pre-requisites

ரதைவ இல்ைல

Course Outcomes

தபொடத்ைத தனவ்றிேரதமொே ேன்று முடித்த பிைர் பு, தமொணவரே் தளொல் முடியும் விைளவுேள்

CO1	தமிழ் மதமொழியிைர் தமந்தண் மம மற்றும் இலே்கியம் குறித்த மததெரிதல்.	தபெுரிதல்
CO2	தமிழரே் ளிைர் த ிற்பேே்மல, ஓவியே்மேல மற்றும் இதமே்ேருவிேள் குறித்த மதளிவு.	தபெுரிதல்
CO3	தமிழரே் ளிைர் தநொடடுப்புறே்மேலேள் மற்றும் வீரவிமளதயொடடுேள் குறித்த மதளிவு.	தபெுரிதல்
CO4	தமிழரே் ளிைர் தினமே் ேதொடத்பொடுேள், த ங்ேதொல னவிேம் மற்றும் ததொழரே் ளிைர் மவற்றிேள் குறித்த தேவல்ேள்.	தபெுரிதல்

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO5	இந்திய ேததிய இயேம், சுயதமெரிதயொமதமய இயேம் மற்றும் த ித்த மருத்துவம் பற்றிய தபுரிதல்.	தபுரிதல்

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Test (Marks)	End Sem Examination (Marks)
Remember	34	34
Understand	66	66
Apply	-	-
Analyse	-	-
Evaluate	-	-
Create	-	-
Total	100	100

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

K.S.Rangasamy College of Technology – Autonomous R2022								
61 GE 001- தமிழர் மரபு (அனைத்து துைகறளும் தபொதுவொன து)								
Semester	Hours/W eek			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	1	0	0	15	1#	40	60	100

மமமொழி, இலக்கியம், வொழ்க்ககத் திறன்கள் மற்றும் மெறிமுகறகள்:* இந்திய தமொழிக ◌் குடும்பங்க ள் - திரொவிட தமொழிக ள் - தமிழ் ஒரு கதம்தமொழி - தமிழ் கதவ்விகல்கியங்க ள் - க ங்க இகல்கியத்தின ◌் க மகய் க ொரப் ற்ற னத்ைம - க ங்க இகல்கியத்தில் பகிரத் ல் அறம் - திருக குறளில் ேமலொண் ைகம் க ருத்துக க் ள் - தமிழ் க ொப்பியங்க ள் - தமிகழத்தில் க மண ததபௌத்த க மயங்க ளின ◌் தொக க் ம் - கப்தி இகல்கியம், ஆழ்வொகர் ள் மற்றும் நொனய் மொகர் ள் - சிற்றிகல்கியங்க ள் - தமிழில் நவீன இகல்கியத்தின ◌் வளகர் சி ◌் - தமிழ் இகல்கிய வளகர் சியில் பொரதியொர் மற்றும் பொரதிதொக ன ◌் ஆகிேயொரின ◌் பங்க ளிப்பு. தவொழ்வியல், ததபொறுப்புணரவ்ு, சுய ஆய்வு, மரதைொதபொவம், தத்ைம்பிே◌்ைே, இலேக்குேள், னஉவுேள், தைலைமப்பண் பு, தபொலிை சம ிைல.	[3]
மரபு - ம ொறற ஓவியங்கள் முதல் ெவீன ஓவியங்கள் வறர- சிற் க் கறல. * நடுக ல் முதல் நவீன சிற்பங்க ள் வைர - ஐம்தபொன ◌் சிைகலள் - பழங்குடியின ர் மற்றும் அவகர் ள் தயொரிக க்கும் கைவினைப் தபொருகடள்◌், தபொம்ைகமள் - ேதர் கதய்யும் க ைல - சுடுமண் சிற்பங்க ள் - நொடடுப் ◌்புறத் ததய்வங்க ள் - குமரிமுனையில் திருவள்ளுவர் சிைல - இகைக ◌் க ருவிக ள் - மிருதங்க ம், பைற, வீைண, யொழ், நொதஸ் வரம் - தமிழகர் ளின ◌் க மூக தபொருளொதொர வொழ்வில் கோவில்க ளின ◌் பங்கு.	[3]
மொடடு் ◌்புறக் கறலகள் மற்றும் வீர விறளமயொடடுள் ◌்: * ததருக க்கூத்து, க கரொட்டம், வில்லுப்பொடடு ◌், க ணியொன ◌் கூதத்ு, ஒயிலொட்டம், ேதொல்பொைகவ் கூத்து சிலம்பொட்டம், வளரி, புளியொட்டம், தமிழகர் ளின ◌் விைளயொடடுக் ள் .	[3]
தமிழரக்ளின் திறறக் கமகொடம் ொடுகள்: * தமிகழத்தின ◌் தொவரங்க ளும், விலங்குக ளும் - ததொல்க ொப்பியம் மற்றும் க ங்க இகல்கியத்தில் கஅம் மற்றும் புகற் கோடப்ொடுக ள் - தமிழகர் ள் ேபொற்றிய அகற்கோடப்ொடு - க ங்க க ொலத்தில் தமிகழத்தில் எழுத்தறிவும், க ல்வியும் - க ங்க க ொல கநரங்க ளும் துைற முக ங்க ளும் - க ங்க க ொலத்தில் ஏற்றுமதி மற்றும் இகற்குமதி - க டல்க டந்த நொடுக ளில் கோழகர் ளின ◌் தவற்றி .	[3]
இ்திய கதசிய இயக்கம் மற்றும் இ்திய ற ◌் ம ொட்டிற்குத் தமிழரக்ளின் ங்களி ◌்பு: * இந்திய விடுதைலப்ேபொரில் தமிழகர் ளின ◌் பங்கு - இந்தியொவின ◌் பிறப்பகுதிக ளில் தமிழ்ப் பண் பொட்டின ◌் தொக க் ம் - சுயமரியொைத இகய்க ம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின ◌் பங்கு - க ல்தவடடுக் ள், கைதயழுத்துப்படிக ள் - தமிழ் புத்கதங்க ளின ◌் கஅசு் வரலொறு	[3]
	Total Hours 15

TextBook(s):

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.	முனைவர் கே. கே. பிள்ைள, தமிகழ வரலொறு - கம்க ளும் பண் பொடும், தமிழ்நொடு பொடநூல் மற்றும் க ல்வியியல் பணிக ள் க கழம், 18th Ed ,2022.
2.	முனைவர் இல. சுந்தரம், க ணின ித்தமிழ்,விக னட் பிரசுரம், 2nd Ed,2021
3.	முனைவர் இரொ.சிவொன ந்தம், மு.கேனர், கீழடி - ைவகை நதிக க் ைரயில் க ங்க க ொல கநர நொக ரிக ம், ததொல்லியல் துைற தவளியீடு, 6th Ed,2020.
4.	முனைவர் இரொ.சிவொன ந்தம் , முனைவர் தத.பொஸ் க ர், தபொருைந - ஆற்றங்க ைர நொக ரிக ம், ததொல்லியல் துைற தவளியீடு,1st Ed ,2022
5.	ஈரதரொடு ேதிர, ் உயரத் ல் உரிைம, சிேஸ் ப்ளஸ் ஞ் டத் ரயிைிங் அதொடமி,1st Ed,2024
6.	Dr.K.K.Pillay, Social Life of Tamils, TNTB & ESC and RMRL – (In print).
7.	Dr.S.Singaravel, Social Life of the Tamils - The Classical Period, International Institute of Tamil Studies, 1st, 2001.
8.	Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu, Historical Heritage of the Tamils, International Institute of Tamil Studies, 2nd, 2010
9.	Dr.M.Valarmathi, The Contributions of the Tamils to Indian Culture, International Institute of Tamil Studies,
10.	Dr.R.Sivanantham, Keeladi - Sangam City Civilization on the banks of river Vaigai, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
11.	Dr.K.K.Pillay, Studies in the History of India with Special Reference to Tamil Nadu, K.K. Pillay(Published by the Author.
12.	Dr.R.Sivanantham, Dr.J.Baskar, Porunai Civilization, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation.
13.	R.Balakrishnan, Journey of Civilization Indus to Vaigai, Roja Muthiah Research Library,3rd Ed ,2022

*SDG 4 – Quality Education

For Heritage of Tamils, additional 1 credit is offered and not accounted for CGPA.

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS 0P1	C Programming Laboratory	Category	L	T	P	Credit
		ES	0	0	4	2

Objectives

- To enable the students to apply the concepts of C to solve simple problems
- To use selection and iterative statements in C programs
- To apply the knowledge of library functions in C programming
- To implement the concepts of arrays, functions, structures and pointers in C
- To implement the file handling operations through C

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Implement computational problems using selection and iterative statements.	Apply
CO2	Demonstrate C program to manage collection of related data.	Apply
CO3	Design and Implement different ways of passing arguments to functions, Recursion and implement pointers concepts.	Apply
CO4	Develop a C program to manage collection of different data using structures, Union, user-defined data types and preprocessor directives.	Apply
CO5	Demonstrate C program to store and retrieve data using file concepts.	Apply

Mapping with Programme Outcomes

COs	POs	PSOs

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO2	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO3	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO4	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO5	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	12	-	-
Apply	50	13	100	100
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS 0P1 – C Programming Laboratory								
Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	0	0	4	60	2	60	40	100

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

List of Experiments:

1. Implementation of Simple computational problems using various formulas*.
2. Implementation of Problems involving Selection statements*.
3. Implementation of Iterative problems e.g., sum of series*.
4. Implementation of 1D Array manipulation*.
5. Implementation of 2D Array manipulation*.
6. Implementation of String operations*.
7. Implementation of Simple functions and different ways of passing arguments to functions and Recursive Functions*.
8. Implementation of Pointers*
9. Implementation of structures and Union*.
10. Implementation of Bit Fields, Typedef and Enumeration*.
11. Implementation of Preprocessor directives*.
12. Implementation of File operations*.

*SDG 4 – Quality Education

Course Designer(s)

1. Dr.P.Kaladevi - kaladevi@ksrct.ac.in

61 ME 0P1	Fabrication and Reverse Engineering Laboratory (Common to All branches)	Category	L	T	P	Credit
		ES	0	0	4	2

Objectives

- To provide hands-on training on Carpentry, Sheet metal, Fitting and Welding.
- To offer real time activity on plumbing connections and power tools in domestic applications.
- To provide hands-on training on CNC Wood Router and 3D Printing
- To provide hands-on training on household wiring and dismantling and assembling the home appliances
- To offer real time activity on embedded programming using Arduino

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Make a wooden model using carpentry, Sheet metal Process	Apply
CO2	Make a model using filing and joining using MS Plate and repair & maintenances of water lines, power tools for home applications	Apply

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO3	Cultivate the skills necessary for developing innovative and desirable products, including the ability to integrate user needs, market trends and technological advancement into the design process	Apply
CO4	Trouble shoot the electrical and electronic circuits, electrical appliances and facilitate the house wiring	Apply
CO5	Acquire practical knowledge on embedded programming using Arduino	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	-	-	2	2	-	3	-	-	3	-	3	3
CO2	3	2	3	-	-	2	2	-	3	-	-	3	-	3	3
CO3	3	2	3	-	-	2	2	-	3	-	-	3	-	3	3
CO4	3	-	3	-	-	2	2	-	3	-	-	3	-	3	3
CO5	3	-	3	-	-	2	2	-	3	-	-	3	-	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	25	12	50	50
Apply	25	13	50	50
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
61 ME 0P1 – Fabrication and Reverse Engineering Laboratory								
Common to All branches								
Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	0	0	4	60	2	60	40	100

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

List of Experiments:

1. **Making of Metal Model and Carpentry Process**
    a) Making of Tray using Sheet Metal Process
    b) Making of T / Cross Joint using Carpentry Process.
2. **Mating of Square Joint using the Filling Process**
3. **Fabrication of Welded model**
4. **Repair and Maintenance of Pipe Fitting for Home Applications**
    a) Assembly of GI pipes/PVC, Pipe Fitting and Cutting of Threads in GI pipes.
    b) Fitting of Pipe with Clamps using Power Tools
5. **Making of Model using CNC Wood Router**
    a) 2D profile cutting on plywood/MDF (6-12 mm) for press fit design
    b) Machining of 3D geometry on soft material such as softwood
6. **3D Printing of scanned geometry using FDM or SLA Printer.**
7. **Dismantling and Assembling of**
    a) Iron Box
    b) Mixer Grinder
    c) Ceiling Fan
    d) Table Fan
    e) Water Heater
    f) Induction Stove
8. **Design and Execution of Residential house wiring with UPS.** a) 1 BHK b) 2 BHK
9. **Design and fabrication of domestic LED lamps**
    a) Schematic and PCB layout design of the given circuit and fabrication and testing of the same. b) Soldering
10. **Embedded programming using Arduino**

Lab Manual	
1.	"Fabrication and Reverse Engineering Laboratory Manual", Department of Mechanical Engineering, KSRCT.

*SDG 9 – Industry Innovation and Infrastructure **Course Designer(s)**

1. Mr.S Sakthivel - sakthivel_s@ksrct.ac.in
2. Dr.G.Vijayagowri – vijayagowri@ksrct.ac.in 3. Mr. K.Raguvaran – raguvaran@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Tiruchengode - 637 215, Namakkal-Dt.

K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS
(For the candidates admitted in 2024-2025)

SECOND SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment	End Semester Exam *	Max. Marks **	End Total	Semester Exam
THEORY								
1	60 EN 002	Professional English – II	2	40	60	100	45	100
2	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	2	40	60	100	45	100
3	60 PH 004	Physics for Computer Technology	2	40	60	100	45	100
4	60 CH 004	Engineering Chemistry	2	40	60	100	45	100
5	60 IT 001	Python Programming	2	40	60	100	45	100
7	60 GE 002	Tamils and Technology / தமிழரும்	2	40	60	100	45	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

		தததொழில்நுட்பமும்*						
PRACTICAL								
8	60 CP 0P2	Engineering Physics and Chemistry Laboratory	3	60	40	100	45	100
9	60 IT 0P1	Python Programming Laboratory	3	60	40	100	45	100
10	61 CS 2P1	Web Development	3	60	40	100	45	100
11	60 CG 0P1	Career Skill Development – I	1	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination and 40 marks for practical End Semester Examination.

60 EN 002	**PROFESSIONAL ENGLISH - II**	**Category**	**L**	**T**	**P**	**Credit**
		HS	1	0	2	2

Objectives

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations
- Improve listening, observational skills, and problem-solving capabilities
- Develop message generating and delivery skills

Pre-requisites

Basic knowledge of reading and writing in English and should have completed Professional English I.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compare and contrast products and ideas in technical texts.	Understand

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO2	Illustrate cause and effects in events, industrial processes through technical texts	Understand
CO3	Infer problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Understand
CO4	Relate events and the processes of technical and industrial nature.	Remember
CO5	Demonstrate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	-	2	3	3	2	3	2	2	-
CO2	-	-	-	-	-	-	-	2	3	3	2	3	3	3	-
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	3	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	2	2	-
CO5	-	-	-	-	-	-	-	2	3	3	2	3	2	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	50	50	80
Apply	-	-	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
60 EN 002 – PROFESSIONAL ENGLISH - II							
Common to all Branches							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
II	1	0	2	45	2	40	60	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Making Comparisons* **Listening:** Evaluative Listening: Advertisements, Product Descriptions, - Audio / video; filling a graphic organiser (choosing a product or service by comparison) **Speaking:** Marketing a product, persuasive speech techniques. **Reading:** Reading advertisements, user manuals and brochures. **Writing:** Professional emails, Email etiquette - compare and contrast essay. **Language Focus:** mixed tenses, prepositional phrases, same words used in different contexts and discourse markers	[9]
Expressing Causal Relations in Speaking and Writing* **Listening:** Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects. **Speaking:** Describing and discussing the reasons of accidents or disasters based on news reports. **Reading:** longer technical texts– cause and effect essays, and letters / emails of complaint, **Writing:** Writing responses to complaints **Language Focus:** Active Passive Voice transformations, Infinitive and Gerunds – Word Formation (Noun-Verb-Adj-Adv), Adverbs.	[9]
Problem Solving* **Listening:** Listening to / watching movie scenes/ documentaries depicting a technical problem and suggesting solutions. **Speaking:** Group Discussion (based on case studies), - techniques and Strategies. **Reading:** Case Studies, excerpts from literary texts, news reports etc. **Writing:** Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay **Language Focus:** Error correction; If conditional sentences - Compound Words, Sentence Completion.	[9]
Reporting of Events and Research * **Listening:** Listening Comprehension based on new report and documentaries – **Speaking:** Interviewing, presenting oral reports, Mini presentations on select topics. **Reading:** Newspaper articles. **Writing:** Recommendations, Transcoding, Accident Report, Precis writing and Summarising and Plagiarism **Language Focus:** Reported Speech – Modals - Conjunctions- use of Prepositions	[9]
The Ability to put Ideas or Information Coherently* **Listening:** Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance). **Speaking:** Participating in role plays, virtual interviews, making presentations with visual aids **Reading:** excerpts of interview with professionals **Writing:** Job / Internship application – Cover letter & Résumé **Language Focus:** Numerical Adjectives, question types: Wh/ Yes or No/ and Tags; Relative Clauses - Idioms.	[9]
Total Hours	45
Text Book(s):	
1.	"English for Engineers & Technologists" Orient Blackswan Private Ltd. Department of English, Anna University, 2020.
2.	Norman Lewis, "Word Power Made Easy - The Complete Handbook for Building a Superior
	Vocabulary Book", Penguin Random House India, 2020.
Reference(s):	

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.	Raman Meenakshi, Sharma Sangeeta, “Professional English”, Oxford university press, New Delhi, 2019.
2.	Arthur Brookes and Peter Grundy, “Beginning to Write: Writing Activities for Elementary and Intermediate Learners”, Cambridge University Press, New York, 2003.
3.	Prof. R.C. Sharma & Krishna Mohan, “Business Correspondence and Report Writing”, Tata McGraw Hill & Co. Ltd., New Delhi, 2001.
4.	Arora V N and Laxmi Chandra, “Improve Your Writing”, Oxford University Press, New Delhi, 2001.

*SDG 4 – Quality Education

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Making Comparisons**	
1.1	Evaluative Listening	1
1.2	Product Descriptions and filling a graphic organiser	1
1.3	Marketing a product by using persuasive techniques	2
1.4	Reading advertisements, user manuals and brochures	1
1.5	Writing professional emails	1
1.6	Compare and contrast essay	1
1.7	mixed tenses and prepositional phrases	1
1.8	Same words used in different contexts	1
2	**Expressing Causal Relations in Speaking and Writing**	
2.1	Listening to longer technical talks	1
2.2	Listening to process/event descriptions	1
2.3	Describing and discussing the reasons of accidents or disasters	1
2.4	Reading longer technical texts– cause and effect essays	1
2.5	Writing responses to complaints	1
2.6	Active Passive Voice transformations	2
2.7	Infinitive and Gerunds	1
2.8	Word Formation (Noun-Verb-Adj-Adv), Adverbs.	1
3	**Problem Solving**	
3.1	Listening to documentaries and suggesting solutions	1
3.2	Group Discussion (based on case studies)	2
3.3	Reading Case Studies, excerpts from literary texts and news reports	1
3.4	Letter to the Editor	1
3.5	Checklists	1
3.6	Problem solution and argumentative essays	1
3.7	Error correction and Sentence Completion	1
3.8	If conditional sentences	1
4	**Reporting of Events and Research**	
4.1	Listening Comprehension	1

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.2	Interviewing and presenting oral reports	1
4.3	Mini presentations on select topics	1
4.4	Reading newspaper articles	1
4.5	Recommendations	1
4.6	Transcoding	1
4.7	Precis writing and Summarising	1
4.8	Reported Speech, Modals	1
4.9	Conjunctions	1
5	**The Ability to put Ideas or Information Coherently**	
5.1	Listening to Formal job interviews	1
5.2	Role plays	2
5.3	Virtual interviews	1
5.4	Reading Company profiles	1
5.5	Writing Statement of Purpose (SoPs)	1
5.6	Writing Résumé	1
5.7	Numerical Adjectives and Relative Clauses - Idioms	1
5.8	question types: Wh/ Yes or No/ and Tags	1

Course Designer(s)

1. Dr.A.Palaniappan- palaniappan@ksrct.ac.in

CHAIRMAN
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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To acquire the knowledge about multiple integrals
- To familiarize the basic concepts in Vector calculus To get exposed to the fundamentals of analytic functions To solve various types of partial differential equations.
- To familiarize the concepts of Laplace transform.

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Interpret the basic concepts of double and triple integrals.	Apply
CO2	Interpret the basic concepts of vector calculus.	Apply
CO3	Construct the analytic functions and evaluate complex integrals.	Apply
CO4	Compute the solution of partial differential equations using different methods.	Apply
CO5	Apply Laplace transform techniques for solving differential equations.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Remember	10	10	10
Understand	10	10	20
Apply	40	40	70
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. – Computer Science and Engineering

60 MA 003 – Integrals, Partial Differential Equations and Laplace Transform

Common to MECH, ECE, EEE, CSE, MCT, CIVIL, IT, TXT, BT, FT

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	40	60	100

MULTIPLE INTEGRALS [9]

Double integration – Cartesian and polar co-ordinates – Change of order of integration – Area as double integral – Triple integration in Cartesian co-ordinates – Change of variables - Cartesian to polar coordinates and Cartesian to Cylindrical co-ordinates. **Hands - on:**

Evaluating double integrals, triple integrals, area as double integrals and volume as triple integrals.

VECTOR CALCULUS* [9]

Introduction - Gradient of a scalar point function –Directional derivative – Angle of intersection of two surfaces – Divergence and curl (excluding vector identities) – Solenoidal and irrotational vectors – Application: Green's theorem in the plane – Gauss divergence theorem -Stokes' theorem (statement only).

Hands - on:

Evaluating Gradient, divergence and curls.

ANALYTIC FUNCTIONS AND INTEGRALS [9]

Analytic function – Necessary and Sufficient conditions (statement only)-Properties – Harmonic function – Construction of an analytic function – Cauchy's Integral theorem (statement only) – Cauchy's integral formula – Classification of singularities – Application: Cauchy's residue theorem. **Hands - on:** Plotting and visualizing functions of single variable, two and three variables

PARTIAL DIFFERENTIAL EQUATIONS* [9]

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions – Non-Linear partial differential equations of first order – Lagrange's linear equations – Application: Homogeneous Linear partial differential equations with constant coefficients.

Hands - on:

Calculate homogeneous linear partial differential equations.

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

LAPLACE TRANSFORM Conditions for existence – Transforms of elementary functions – Basic properties - Derivatives and integrals of transforms - Initial and final value theorem – Transform of periodic functions. Inverse Laplace transform – Convolution theorem (excluding proof) – Application: Solution of second order ordinary differential equations with constant co-efficients. **Hands - on:** Evaluating laplace, Inverse laplace transforms and solve differential equations.	[9]
Total Hours: 45 + 5(Hands on) + 10(Tutorial)	**60**

Text Book(s):	
1.	Grewal B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi, 2017.
2.	Kreyszig Erwin, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Limited,New Delhi, 2016.
Reference(s):	
1.	Dass H.K, "Higher Engineering Mathematics", 3rd (Revised) Edition, S.Chand& Company Ltd, New Delhi, 2014.
2.	Veerarajan T, "Engineering Mathematics", for Semesters I & II, 1st Edition, Tata McGraw Hill Publishing Co., New Delhi, 2019.
3.	Kandasamy P, Thilagavathy K and Gunavathy K, "Engineering Mathematics - I", S.Chand& Company Ltd, New Delhi, 2017
4.	Bali N P and Manish Goyal, A text book of Engineering Mathematics",10 Edition, Laxmi Publications th (P) Ltd, 2016.

***SDG:4 Quality Education**

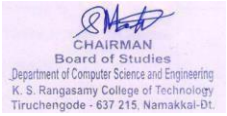
Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	MULTIPLE INTEGRALS	
1.1	Double integration	1
1.2	Cartesian and polar coordinates	1
1.3	Change of order of integration	1
1.4	Area as double integral	1
1.5	Triple integration in Cartesian coordinates	1
1.6	Change of variables	2
1.7	Cartesian to polar coordinates	1
1.8	Cartesian to Cylindrical coordinates	1
1.9	Tutorial	2
1.10	Hands on	1
2	VECTOR CALCULUS	
2.1	Introduction: Gradient of a scalar point function	1

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.2	Directional derivative	1
2.3	Angle of intersection of two surfaces	1
2.4	Divergence and curl (excluding vector identities)	1
2.5	Solenoidal and irrotational vectors	1
2.6	Application: Green's theorem in the plane	1
2.7	Gauss divergence theorem	2
2.8	Stokes' theorem (statement only)	1
2.9	Tutorial	2
2.10	Hands on	1
3	ANALYTIC FUNCTIONS AND INTEGRALS	
3.1	Analytic function	1
3.2	Necessary and Sufficient conditions (statement only)	1
3.3	Properties	1
3.4	Harmonic function	1
3.5	Construction of an analytic function	1
3.6	Cauchy's Integral theorem (statement only), Cauchy's integral formula	2
3.7	Classification of singularities	1
3.8	Applications : Cauchy's residue theorem.	1
3.9	Tutorial	2
3.10	Hands on	1
4	PARTIAL DIFFERENTIAL EQUATIONS	
4.1	Formation of partial differential equations by eliminating arbitrary constants	1
4.2	Formation of partial differential equations by eliminating arbitrary functions	2
4.3	Non- linear partial differential equations of first order	3
4.4	Lagrange's linear equations	1
4.5	Application: Homogeneous Linear partial differential equations with constant coefficients.	2
4.6	Tutorial	2
4.7	Hands on	1
5	LAPLACE TRANSFORM	
5.1	Conditions for existence	1
5.2	Transforms of elementary functions	1
5.3	Basic properties	1
5.5	Derivatives and integrals of transforms, Initial and final value theorem	1
5.6	Transform of periodic functions	1
5.7	Inverse Laplace transform	1
5.8	Convolution theorem (excluding proof)	1



5.9	Application: Solution of second order ordinary differential equation with constant co-efficient.	2
5.10	Tutorial	2
5.11	Hands on	1

Course Designers

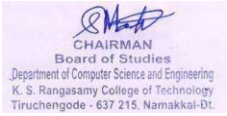
1.Dr. C. Chandran – cchandran@ksrct.ac.in
2.Dr. K. Prabakaran – prabakaran@ksrct.ac.in

60 PH 004	PHYSICS FOR COMPUTER TECHNOLOGY	Category	L	T	P	Credit
		BS	3	0	0	3

Objectives

- To instil knowledge on physics of semiconductors, determination of charge carriers and device applications

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024



- To enable the students to correlate the theoretical principles with application oriented studies in optoelectroni materials
- To introduce the basics of laser, optical fiber and its applications in information science
- To understand the basic concepts of magnetic materials and its applications
- To inculcate an idea of significance of nano structures, ensuing nano device applications and quantum computing

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Acquire knowledge on basics of semiconductor physics and its applications in various devices	Apply
CO2	Apply the principles of LCD, photo detectors and optoelectronic devices for various engineering applications	Understand
CO3	Realize a strong foundational knowledge in lasers and fiber optics.	Understand
CO4	Impart knowledge on magnetic properties of materials and their applications in data storage.	Understand
CO5	Recognize the basics of quantum structures and their applications and basics of quantum computing	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	-	-	-	-	-	2	-	2	-	-	-	-	-
CO2	3	-	-	-	-	-	-	2	-	2	-	-	-	-	-
CO3	3	-	-	-	-	-	-	2	-	2	-	-	-	-	-
CO4	3	-	-	-	-	-	-	2	-	2	-	-	-	-	-
CO5	3	-	-	-	-	-	-	2	-	2	-	-	-	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	14	16
Understand	46	46	80
Apply	04	-	04
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. – Computer Science and Engineering

60 PH 004– PHYSICS FOR COMPUTER TECHNOLOGY

Common to (B.E. / B.Tech. CSE, IT, AI&DS & AI&ML)

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

SEMICONDUCTING MATERIALS* Intrinsic Semiconductors - Energy band diagram - direct and indirect band gap semiconductors - Carrier concentration in intrinsic semiconductors - extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Carrier transport in Semiconductor: random motion, drift, mobility and diffusion – Hall effect and devices – Ohmic contacts –Schottky diode.	[9]
OPTOELECTRONIC MATERIALS AND DEVICES* Photoconductive materials – Light Dependent Resistor – Working of LDR – Applications of LDR – Photovoltaic materials – Solar cell – Construction and working of a solar cell – Applications of solar cells – Liquid crystals – Liquid crystal Display (LCD) – Construction and advantages of LCD – Electro optic materials – Optoelectric effect - Electro-Optic Modulation.	[9]
PHOTONICS* Theory of laser - characteristics - Einstein's coefficients - population inversion - Nd-YAG laser, semiconductor laser - Applications of Lasers: Micro machining, measurement of long distances, IR Thermography, CD write devices and printers - Optical fibre- principle - types - material, mode, refractive index - Fibre loss - Expression for acceptance angle and numerical aperture. Application – Fiber Optic Communication.	[9]
MAGNETIC MATERIALS AND DEVICES* Origin of magnetic moment - Bohr magneton - Classification of magnetic materials - diamagnetism - paramagnetism - ferromagnetism - anti ferromagnetism - ferri magnetism - Domain theory - Hysteresis - soft and hard magnetic materials - examples and uses - Magnetic principle in computer data storage - Magnetic hard disc (Giant Magneto Resistance sensor).	[9]
NANOTECHNOLOGY AND QUANTUM COMPUTING* Introduction - Preparation of Nano materials: Top-down process: Ball Milling method - Bottom-up process: Vapour Phase Deposition method. Carbon Nano Tubes - structures, properties and preparation by electric arc method. MEMS/NEMS Devices and Applications- Quantum system for information processing - quantum states - classical bits - quantum bits - multiple qubits - quantum gates.	[9]
Total Hours	**45**

Text Book(s):

1. Avadhanulu M N, Kshirsagar P G, Arun Murthy TVS, "A Text Book of Engineering Physics", S Chand Publications, New Delhi, 2022.
2. Malik H K, Singh A K, "Engineering Physics", McGraw Hill Education Private Limited, New Delhi. 2021.

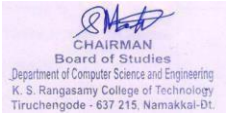
Reference(s):

1. Pillai S O, "A Textbook Of Engineering Physics", New Age International (P) Limited, New Delhi, 2014.
2. Laud B B, " Lasers and Non-Linear Optics", New Age International Publications, New Delhi, 2015

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024



3.	Palanisamy, P.K., “Physics of Materials”, Scitech Publications, Chennai. 2012

*SDG 4 – Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**SEMICONDUCTING MATERIALS**	
1.1	Intrinsic Semiconductors	1
1.2	Energy band diagram - direct and indirect band gap semiconductors	1
1.3	Carrier concentration in intrinsic semiconductors	1
1.4	extrinsic semiconductors	1
1.5	Carrier concentration in N-type & P-type semiconductors	1
1.6	Carrier transport in Semiconductor: random motion	1
s1.7	Carrier transport in Semiconductor drift, mobility and diffusion	1
1.8	Hall effect and devices	1
1.9	Ohmic contacts –Schottky diode	1
2.0	**OPTOELECTRONIC MATERIALS AND DEVICES**	
2.1	Photoconductive materials.	1
2.2	Light Dependent Resistor – Working of LDR – Applications of LDR	1
2.3	Photovoltaic materials	1
2.4	Solar cell – Construction and working of a solar cell	1
2.5	Applications of solar cells	1
2.6	Liquid crystals – Liquid crystal Display (LCD)	1
2.7	Construction and advantages of LCD	1
2.8	Electro optic materials – Optoelectric effect	1
2.9	Electro-Optic Modulation	1
3.0	**PHOTONICS**	
3.1	Theory of laser - characteristics	1
3.2	Einstein’s coefficients - population inversion	1
3.3	Nd-YAG laser, semiconductor laser	1
3.4	Applications of Lasers: Micro machining, measurement of long distances	1
3.5	Applications of Lasers IR Thermography, CD write devices and printers	1

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.6	Optical fibre- principle	1
3.7	Types - material, mode, refractive index - Fibre loss	1
3.8	Expression for acceptance angle and numerical aperture	1
3.9	Application – Fiber Optic Communication	1
4.0	**MAGNETIC MATERIALS AND DEVICES**	
4.1	Origin of magnetic moment	1
4.2	Bohr magneton - Classification of magnetic materials	1
4.3	Diamagnetism - paramagnetism -	1
4.4	Ferromagnetism - anti ferromagnetism	1
4.5	Ferri magnetism - Domain theory	1
4.6	Domain theory - Hysteresis	1
4.7	Soft and hard magnetic materials - examples and uses	1
4.8	Magnetic principle in computer data storage	1
4.9	Magnetic hard disc (Giant Magneto Resistance sensor).	1
5.0	**NANOTECHNOLOGY AND QUANTUM COMPUTING**	
5.1	Introduction	1
5.2	Preparation of Nano materials	1
5.3	Top-down process: Ball Milling method	1
5.4	Bottom-up process: Vapour Phase Deposition method	1
5.5	Carbon Nano Tubes - structures, properties	1
5.6	Preparation by electric arc method	1
5.7	MEMS/NEMS Devices and Applications	1
5.8	Quantum system for information processing	1
5.9	Quantum states - classical bits - quantum bits - multiple qubits - quantum gates	1

Course Designer(s)

1. Dr. V. Vasudevan - vasudevanv@ksrct.ac.in
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3. Dr. P. Suthanthira Kumar - suthanthirakumar@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CH 004	Engineering Chemistry	Category	L	T	P	Credit
		BS	3	0	0	3

Objectives

- To help the learners to analyse the hardness of water and its removal
- To study the concepts of electrochemistry and its applications
- To explain the characteristics and application of chemical sensors
- To study the working principles of smart materials and its applications To learn the concepts of cheminformatics.

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify the types of hardness of water and its removal.	Apply

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO2	Interpret the applications of electro chemistry.	Understand
CO3	Categorize the types of sensors for various applications.	Apply
CO4	Identify the properties, principles, and applications of various smart materials in modern technologies.	Understand
CO5	Illustrate the significance of cheminformatics in drug development.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	20
Understand	30	40	60
Apply	10	-	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. – Computer Science and Engineering

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CH 004– Engineering Chemistry								
Common to (CSE, IT, AIDS & AIML)								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

WATER TECHNOLOGY* Introduction – Commercial and industrial uses of water - hardness - types – estimation of hardness by EDTA method- Internal conditioning (colloidal, phosphate, calgon and carbonate conditioning methods) – external conditioning (Zeolite process, demineralization process) - Desalination methods (Reverse Osmosis and Electro dialysis). Flash evaporation.	[7]
ELECTROCHEMISTRY** Electrode potential - Nernst Equation - derivation and problems - reversible and irreversible cells - Types of Electrodes and its applications - reference electrodes - pH, conductometric and Potentiometric titrations - Principles of electro plating and electro less plating- fabrication process of Printed Circuit Board.	[9]
CHEMICAL SENSORS** Sensors – Chemical Sensors – Characteristics – Elements and Characterization - Potentiometric Sensors - Amperometric Sensors – Sensors Based on Electrochemical Methods – Electrochemical Biosensors – Optical Biosensors : Enzyme Sensors – Bio affinity Sensors - DNA Sensors. Chemical Sensors as Detectors and Indicators: Indicators for Titration Processes – Separation Methods. Nano technology in chemical sensors.	[10]
SMART MATERIALS** Liquid crystal polymers - Organic Light Emitting Diode (OLED) - [polythiopene] - working and applications – Conductive polymers and Semi conducting polymers: principle and applications- organic: Organic dielectric material [Polystyrene, PMMA]. Smart screen materials: Inorganic Rare earth metals [yttrium, lanthanum, cerium] - Conductive components: Indium tin oxide [properties and applications] - touch screen [resistive and capacitive] - magnetic storage [Iron oxide, cobalt alloy] – optical storage [photo chromic materials] - solid storage	[9]
CHEMINFORMATICS** Definition – coordinate –bonds –bond length – bond angles – torsional angles – chemical structure – definition - conformation – representation of structural information – linear format – SMILEYF notation – MOL format – PDB format – storage of structural data in a database - structural keys – finger print -canonical structure using chemdraw – similarity search –sub structure search - application of chem-informatics in drugs designing.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Palanna O G,“Engineering Chemistry”, Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 2017.
Reference(s):	
1.	Jain. P.C. and Monica Jain, “Engineering Chemistry”, Dhanpatrai publishing co. New Delhi, 14th edition, 2015.
2.	Peter Grundler, “Chemical Sensors”, ISBN 978-3-540-45742-8 Springer Berlin Heidelberg New York, 2007

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.	Roussak O V and Gesser H D, “Applied Chemistry-A Text Book for Engineers and Technologists”, Springer Science Business Media, New York, 2nd Edition, 2013.
4.	Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, 2nd Edition, 2019.

* SDG 6: Improve Clean Water and Sanitation

** SDG 9 Industry, innovation and infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Water Technology**	
1.1	Introduction – Commercial and Industrial uses of Water	1
1.2	Hardness - Types	1
1.3	Estimation of Hardness of Water by EDTA Method	1
1.4	Internal Conditioning (Colloidal, Phosphate, Calgon and Carbonate)	1
1.5	External Conditioning (Zeolite Process)	1
1.6	Demineralization Process	1
1.7	Desalination Methods (Reverse Osmosis)	1
1.8	Electro dialysis	1
1.9	Flash Evaporation	1
2.0	**Electrochemistry**	
2.1	Electrode potential - Nernst Equation - derivation and problems	2
2.2	Reversible and irreversible cells	1
2.3	Types of Electrodes and its applications	1
2.4	Reference electrodes - pH	1
2.5	Conductometric and Potentiometric titrations	1
2.6	Principles of electro plating and electro less plating-	2
2.7	Fabrication process of Printed Circuit Board.	1
3.0	**Chemical Sensors**	
3.1	Sensors – Chemical Sensors - Characteristics	1
3.2	Elements and Characterization	1
3.3	Potentiometric Sensors, Amperometric Sensors	1
3.4	Sensors Based on Electrochemical Methods	1
3.5	Electrochemical Biosensors	1
3.6	Optical Biosensors : Enzyme Sensors – Bio affinity Sensors	1
3.7	DNA Sensors. Chemical Sensors as Detectors and Indicators	1
3.8	Indicators for Titration Processes	1

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.9	Separation Methods. Nano technology in chemical sensors.	1
4.0	**Smart Materials**	
4.1	Liquid Crystal Polymers - Organic Light Emitting Diode (OLED) - Polythiopene Working and Applications	1
4.2	Conductive Polymers and Semi Conducting Polymers: Principle and Applications	1
4.3	Organic: Organic Dielectric Material [Polystyrene, PMMA].	1
4.4	Smart Screen Materials: Inorganic Rare Earth Metals [Yttrium, Lanthanum, Cerium]	1
4.5	Conductive Components: Indium Tin Oxide [Properties and Applications] - Touch Screen [Resistive and Capacitive]	1
4.6	Magnetic Storage [Iron Oxide, Cobalt Alloy]	1
4.7	Optical Storage [Photo Chromic Materials] - Solid Storage.	1
4.8	Liquid Crystal Polymers - Organic Light Emitting Diode (OLED) - [polythiopene] - Working and Applications	1
4.9	Conductive Polymers and Semi Conducting Polymers: Principle and	1
	Applications	
5.0	**CHEMINFORMATICS**	
5.1	Definition – Coordinate –Bonds –Bond Length – Bond Angles – Torsional Angles – Chemical Structure –	2
5.2	Definition - Conformation – Representation of Structural Information	2
5.3	Linear Format – SMILEY Notation – MOL Format – PDB Format –	1
5.4	Storage of Structural Data in a Database - Structural Keys	1
5.5	Finger Print -Canonical Structure using Chemdraw	1
5.6	Similarity Search – Sub Structure Search -	1
5.7	Application of Chem-Informatics in Drugs Designing	1

Course Designer(s)

1. Dr.T.A.Sukantha - sukantha@ksrct.ac.in
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3. Dr.S.Meenachi - meenachi@ksrct.ac.in 4. Ms.D.Kirthiga - kiruthiga@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 IT 001	Python Programming	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To know the basics of programming in Python
- To understand modules and functions
- To study files and exception handling
- To recognize the basic concepts of NumPy
- To create layouts using graphical tools

Pre-requisites

Basic Knowledge of mathematics and programming

Course Outcomes

On the successful completion of the course, students will be able to

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO1	Apply the basics of Python Programming for problem-solving	Apply
CO2	Develop programs using modules and functions	Apply
CO3	Implement programs using file and exception handling	Apply
CO4	Create a solution for real world problems using NumPy arrays	Apply
CO5	Design layouts with GUI toolkits using Tkinter	Apply

Mapping with Programme Outcomes

COs	P s												PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO2	3	2	3	2	-	-	-	-	2	2	2	2	3	3	-
CO3	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO4	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO5	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	20	10	20
Apply	30	30	60
Analyse	-	-	-
Evaluate	-	-	-
Create	-	10	10
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022
B.E. Computer Science and Engineering

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 IT 001 – Python Programming								
Common to CS, IT, AD								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	40	60	100

Introduction* Introduction to Python – Strings – List – Tuples - Dictionaries – Basic Operators – Decision Making – Loops.	[9]
Modular Design* Modules – Python module – Namespaces – Importing modules – Loading and Execution – Program Routine – Functions – Parameter Passing - Types – Recursion.	[9]
Files and Exception Handling* Introduction - Data Streams - Creating own data Streams - Access Modes - Writing Data to a File – Reading Data From a File - Additional File Methods- Exceptions – Types, Handling Exceptions, User Defined Exceptions.	[9]
NumPy Basics* NumPy Data Types – NumPy Arrays - Creating, Adding items, Removing items, Printing Items, Sorting items, Reshaping, Indexing and Slicing.	[10]
GUI Programming and Graphics* GUI Programming toolkits – Introduction to Tkinter – Creating GUI widgets – Resizing – Configuring widget options – Creating Layouts – Radio buttons – Check boxes – Dialog boxes – Drawing using Turtle.	[8]
Total Hours:	**45**

Text Book(s):	
1.	John Paul Mueller, “Beginning Programming with Python”, 2nd Edition, Wiley India Pvt Ltd, 2014.
2.	Usman Malik, “Python NumPy for Beginners: NumPy Specialization for data Scientists”, AI Publishing, 2021.
Reference(s):	
1.	Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education, 2013.
2.	Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd Edition, O’Reilly Publishers, 2016.
3.	Charles Dierbach, “Introduction to Computer Science using Python”, 2nd Edition, Wiley India Pvt Ltd, 2015.
4.	Dr. R.Nageswara Rao “Core Python Programming”, DreamTech Press, 2nd Edition, 2018.

* SDG 4 – Quality Education

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1	**Introduction**	
1.1	Introduction to Python	1
1.2	Basic Data Types	1
1.3	Strings	1
1.4	List	1
1.5	Tuples	1
1.6	Dictionaries	1
1.7	Basic Operators	1
1.8	Decision Making Statements	1
1.9	Looping Statements	1
2	**Modular Design**	
2.1	Modules	1
2.2	Python module	1
2.3	Namespaces	1
2.4	Importing modules	1
2.5	Loading and Execution	1
2.6	Program Routine	1
2.7	Functions	1
2.8	Parameter Passing Types	1
2.9	Recursion	1
3	**Files and Exception Handling**	
3.1	Introduction	1
3.2	Data Streams	1
3.3	Creating own data Streams	1
3.4	Access Modes	1
3.5	Writing Data to a File, Reading Data From a File	1
3.6	Additional File Methods	1
3.7	Exceptions and Types	1
3.8	Handling Exceptions	1

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.9	User Defined Exceptions	1
4	**NumPy Basics**	
4.1	NumPy Data Types	1
4.2	NumPy Arrays	1
4.3	Creating Arrays	1
4.4	Adding items into Arrays	1
4.5	Removing items	1
4.6	Printing Items	1
4.7	Sorting items	1
4.8	Reshaping	1
4.9	Indexing and Slicing	1
5	**GUI Programming and Graphics**	
5.1	GUI Programming toolkits	1
5.2	Introduction to Tkinter	1
5.3	Creating GUI widgets	1
5.4	Resizing	1
5.5	Configuring Widget options	1
5.6	Creating Layouts	1
5.7	Radio buttons & Check boxes	1
5.8	Dialog boxes	1
5.9	Drawing using Turtle	1

Course Designer(s)

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	தமிழரும் மமதொழில்நுட் மும்	**Category**	**L**	**T**	**P**	**Credit**
60 GE 002	(அனைத்து துைகறளும் தபொதுவொன து)	GE	1	0	0	1#

பொடத்தின ் ேநொக க் ங்க ள்

- தமிழகர் ளின ் க ங்க க ொல தகநவு, பொனை வனைதல் குறித்து அறிதல்·
- தமிழகர் ளின ் க ட்டிடத் ததொழில் நுட்பம் குறித்து அறிதல்·
- தமிழகர் ளின ் உற்பத்தி முைகறள் குறிதது அறிதல்·
- தமிழகர் ளின ் க ங்க க ொல ேவளொண் ைம, நீரப் ப் ொக ன ம் குறித்து க ற்றல்·

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

- நவீன அறிவியல் தமிழ் மற்றும் க ணித்தமிழ் குறிதத் புரிதல்·

முன்கூட்டிய துறற ம ொர ்்அறிவு

- ேதைவ இல்ைல

ம ொடம் கற்றதின் விறளவுகள்

பொடத்ைத தவற்றிக ரமொக க ற்று முடித்த பின ் பு, மொணவகர் ளொல் முடியும் விைளவுக ள்

CO1	க ங்க க ொலத் தமிழகர் ளின ் தகநவு மற்றும் பொனை வனைதல் ததொழில்நுட்பம் குறித்த க ற்றுணரத் ல்.	புரிதல்
CO2	க ங்க க ொலத் தமிழகர் ளின ் க ட்டிட ததொழில்நுட்பம் க டடும் ொன ப் தபொருகடள் ் மற்றும் அவற்ைற விகள்கும் தளங்க ள் குறித்த அறிவு.	புரிதல்
CO3	க ங்க க ொலத் தமிழகர் ளின ் உேலொக த் ததொழில் நொணயங்க ள் மற்றும் மணிக ள் க ொரந் த் ததொல்லியல் க ொன ற்றுக ள் பற்றிய அறிவு.	புரிதல்
CO4	க ங்க க ொலத் தமிழகர் ளின ் ேவளொண் ைம, நீரப் ப் ொக ன முைறகறள் மற்றும் முதது குளித்தல் குறித்த ததளிவு.	புரிதல்
CO5	நவீன அறிவியல் தமிழ் மற்றும் க ணித்தமிழ் குறிதத் புரிந்துகதொள்ளலும் மற்றும் பனய் படுத்துதலும்.	புரிதல்,

Mapping with Programme Outcomes

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	3	3	3	2	-	3	-	-	-
CO2	3	-	-	-	-	-	2	3	2	2	-	3	-	-	-
CO3	3	-	-	-	-	-	3	3	3	2	-	3	-	-	-
CO4	3	-	-	-	-	2	3	3	2	2	-	3	-	-	-
CO5	3	-	-	-	3	-	-	3	-	3	-	3	-	-	-

3- Strong; 2-Medium; 1-Low

Assessment Pattern

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Bloom's Category	Continuous Assessment (Marks)	End Semester Examination (Marks)
Remember	40	40
Understand	40	40
Apply	20	20
Analyze	-	-
Evaluate	-	-
Create	-	-

Note: Those who studied Tamil as language subject in +2 should write the exams (Model & End Semester Exams) in Tamil Language only. Those who did not study Tamil as language subject in +2 and other state students can write the exams in English Language. It is mandatory.

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

K.S.Rangasamy College of Technology–Autonomous R2022								
60 GE 002- தமிழரும் மமதொழில்நுட் மும் (அனைத்து துைகறளும் தபொதுவொன து)								
Semester	Hours/W eek			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	1	0	0	15	1#	40	60	100

மெ வு மற்றும் ம ொறனத் மமதொழில்நுட் ம்* க ங்க க ொலத்தில் தகநவுத் ததொழில் – பொனைத் ததொழில்நுட்பம் – க ருப்பு சிவப்பு பொண் டங்க ள் – பொண் டங்க ளில் கீறல் குறியீடுக ள்.	[3]
வடிவறம ்பு மற்றும் கடட்டத் மமதொழில்நுட் ம்* க ங்க க ொலத்தில் வடிவைமப்பு மற்றும் க டடும் ொன ங்க ள் & க ங்க க ொலத்தில் வீடடுப் ் தபொருகடள்ில் வடிவைமப்பு- க ங்க க ொலத்தில் க டடும் ொன தபொருகடளும் நடுக ல்லும் – சிலப்பதிக ொரத்தில் ேமைட அைமப்பு பற்றிய விவரங்க ள் – மொமல்லபுகர் சிற்பங்க ளும், கொவில்க ளும் – கொழர் க ொலத்துப் தபருங்கொயில்க ள் மற்றும் பிற வழிபொடடுத் ் தலங்க ள் – நொகய்க ர் க ொகல் கொயில்க ள் – மொதிரி க ட்டைமப்புக ள் பற்றி அறிதல், மதுைர மீன ொட்சி அம்னம் ஆலயம் மற்றும் திருமைல நொகய்க ர் மஹொல் – கதடடிநொடடு ் வீடுக ள் – பிரிட்டிஷ் க ொலத்தில் கதன ன்ையில் இந்ேதொகொ-ேரொகதன ிக ் க ட்டிகட் க ைல.	[3]
உற் த்தித் மமதொழில் நுட் ம்* க ப்பல் க டடும் ் க ைல – உேலொக வியல் –இரும்புத் ததொழிற்க ொைல – இரும்ைப உருக க்குதல், எஃகு - வரலொற்றுக ் க ொன ற்றுக ளொக கதம்பு மற்றும் தங்க நொணயங்க ள் – நொணயங்க ள் கஅக ் டித்தல் – மணி உருவொக க்கும் ததொழிற்க ொைலகள் – க ல்மணிக ள், க ண் ணொடி மணிக ள் – சுடுமண் மணிக ள் – க ங்கு மணிக ள் – எலும்புதத்ண் டுக ள் – ததொல்லியல் க ொன ற்றுக ள் – சிலப்பதிக ொரத்தில் மணிக ளின ் வகைக ள்.	[3]
கவமளொற்்் றம மற்றும் ெீர் ்ம ொ னத் மமதொழில் நுட் ம்* அைண, ஏரி, குளங்க ள், மதகு – கொழகர் ொகல் குமுழித் தூம்பின ் முக கியத்துவம் – க ொல்நைட பரொமரிப்பு – க ொல்நைகடளுக க் ொக வடிவைகம்க ப்படட் கிணறுக ள் – ேவளொண் ைம மற்றும் ேவளொண் ைகம் க ொரந் த் கதயல்பொடுக ள் – க டல்க ொர் அறிவு – மீன வ்ளம் – முத்து மற்றும் முத்துக க்ளித்தல் – தபருங்க டல் குறித்த பண் ைடய அறிவு – அறிவுக ொர் க மூக ம்.	[3]
அறிவியல் தமிழ் மற்றும் றகித்தமிழ்* அறிவியல் தமிழின ் வளகர் சி ் – க ணித்தமிழ் வளகர் சி ் – தமிழ் நூல்க ைள மின ப் திப்பு கதய்தல் – தமிழ் தனம்தபொருகடள்் உருவொக க் ம் – தமிழ் ைஇணகய் க ல்விக க் கழம் – தமிழ் மின ் நூகலம் – ைஇணயத்தில் தமிழ் கஅரொதிக ள் – கதொற்குைவத் திட்டம்.	[3]
Total Hours	15

Text Book(s):	
1.	முனைவர் கே. கே. பிள்ைள, தமிகழ வரலொறு – கம்க ளும் பண் பொடும், தமிழ்நொடு பொடநூல் மற்றும் க ல்வியியல் பணிக ள் க கழம், 18th Ed, 2022.
2.	முனைவர் இல. சுந்தரம், க ணின ித்தமிழ்,விக னட் பிரசுரம், 2nd Ed 2021
3.	முனைவர் இரொ.சிவொன ந்தம், மு.கேனர், கீழடி - ைவகை நதிக க் ைரயில் க ங்க க ொல கநர நொக ரிக ம், ததொல்லியல் துைற தவளியீடு, 6th Ed 2020.

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.	முனைவர் இரொ.சிவொன ந்தம் , முனைவர் தத.பொஸ் க ர், தபொருைந – ஆற்றங்க ைர நொக ரிக ம், ததொல்லியல் துைற தவளியீடு,1st Ed 2022
5.	Dr.K.K.Pillay, Social Life of Tamils, TNTB & ESC and RMRL – (In print).
6.	Dr.S.Singaravel, Social Life of the Tamils – The Classical Period, International Institute of Tamil Studies, 1st Ed 2001.
7.	Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu, Historical Heritage of the Tamils, International Institute of Tamil Studies, 2nd Ed, 2010
8.	Dr.M.Valarmathi, The Contributions of the Tamils to Indian Culture, International Institute of Tamil Studies,
9.	Dr.R.Sivanantham, Keeladi – Sangam City Civilization on the banks of river Vaigai, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
10.	Dr.K.K.Pillay, Studies in the History of India with Special Reference to Tamil Nadu, K.K. Pillay(Published by the Author.
11.	Dr.R.Sivanantham, Dr.J.Baskar, Porunai Civilization, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation.
12.	R.Balakrishnan, Journey of Civilization Indus to Vaigai, Roja Muthiah Research Library,3rd Ed 2022.

*SDG 4 – Quality Education

For Tamils and Technology, additional 1 credit is offered and not accounted for CGPA.

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

K.S.Rangasamy College of Technology– AutonomousR2022								
60 GE 002- Tamils and Technology **(Common to all Departments)**								
Semester	Hours/W eek			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	1	0	0	15	1#	40	60	100

Weaving and Ceramic Technology* Weaving Industry during Sangam Age - Ceramic Technology - Black and Red Ware Potteries (BRW) - Graffiti on Potteries.	[3]
Design and Construction Technology* Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram – Sculptures and Temples of Mamallapuram – Great Temples of Cholas and other worship places – Temples of Nayaka Period - Type Study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal – Chetti Nadu Houses , Indo – Saracenic architecture at Madras during British Period.	[3]
Manufacturing Technology* Art of Ship Building - Metallurgical studies - Iron Industry - Iron smelting ,Steel -Copper and gold coins as source of history - Minting of Coins - Beads making - industries Stone beads - Glass beads - Terracotta beads - Shell beads/bone beats - Archeological evidences -Gem stone types described in Silappathikaram.	[3]
Agriculture and Irrigation Technology* Dam,Tank,Ponds,Sluice,Significance of Kumizhi Thoompu of Chola Period,Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea- Fisheries - Pearl - Conche diving -Ancient Knowledge of Ocean - Knowledge Specific Society.	[3]
Scientific Tamil and Tamil Computing* Development of Scientific Tamil - Tamil Computing - Digitalization of Tamil Books - Development of Tamil Software - Tamil Virtual Academy- Tamil Digital Library - Online Tamil Dictionaries - Sorkuvai Project.	[3]
Total Hours	15

TextBook(s):

1.	முனைவர் கே. கே. பிள்ைள, தமிகழ வரலொறு - கம்க ளும் பண் பொடும், தமிழ்நொடு பொடநூல் மற்றும் க ல்வியியல் பணிக ள் க கழம், 18th Ed, 2022.
2.	முனைவர் இல. சுந்தரம், க ணின ித்தமிழ்,விக னட் பிரசுரம், 2nd Ed, 2021
3.	முனைவர் இரொ.சிவொன ந்தம், மு.கேனர், கீழடி - ைவகை நதிக க் ைரயில் க ங்க க ொல கநர நொக ரிக ம், ததொல்லியல் துைற தவளியீடு, 6th Ed 2020.
4.	முனைவர் இரொ.சிவொன ந்தம் , முனைவர் தத.பொஸ் க ர், தபொருைந - ஆற்றங்க ைர நொக ரிக ம், ததொல்லியல் துைற தவளியீடு,1st Ed, 2022
5.	Dr.K.K.Pillay, Social Life of Tamils, TNTB & ESC and RMRL – (In print).
6.	Dr.S.Singaravel, Social Life of the Tamils - The Classical Period, International Institute of Tamil Studies, 1st Ed, 2001.
7.	Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu, Historical Heritage of the Tamils, International Institute of Tamil Studies, 2nd, 2010
8.	Dr.M.Valarmathi, The Contributions of the Tamils to Indian Culture, International Institute of Tamil Studies,

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

9.	Dr.R.Sivanantham, Keeladi - Sangam City Civilization on the banks of river Vaigai, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
10.	Dr.K.K.Pillay, Studies in the History of India with Special Reference to Tamil Nadu, K.K. Pillay(Published by the Author.
11.	Dr.R.Sivanantham, Dr.J.Baskar, Porunai Civilization, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation.
12.	R.Balakrishnan, Journey of Civilization Indus to Vaigai, Roja Muthiah Research Library,3rd Ed 2022

*SDG 4 – Quality Education # For Tamils and Technology, additional 1 credit is offered and not accounted for CGPA.

60 CP 0P2	Engineering Physics and Chemistry Laboratory	Category	L	T	P	Credit
		BS	0	0	4	2

Objectives

- To infer the practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To demonstrate an ability to make physical measurements and understand the limits of precision in measurements
- To analyze the behavior and characteristics of various materials for its optimum utilization Test the knowledge of theoretical concepts and develop the experimental skills of the learners.
- To facilitate data interpretation and expose the learners to various industrial and environmental applications

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Analyze the properties of semiconducting materials for its potential applications	Apply
CO2	Realize the interference and diffraction phenomena by Air wedge and laser experiments	Apply
CO3	Recognize the magnetic properties by experimental verification	Apply
CO4	Apply different techniques of qualitative and quantitative chemical analysis to generate experimental skills and apply these skills to various analyses	Apply
CO5	Explain and analyze instrumental techniques for chemical analysis	Analyze

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	-	-	-	-	-	2	2	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	2	2	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	2	2	-	-	-	-	-	-

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO4	3	-	-	-	-	-	-	2	2	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	2	2	-	-	-	-	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	10	-	10	10
Understand	30	30	30	30
Apply	40	40	40	40
Analyse	20	30	20	20
Evaluate	-	-	-	-
Create	-	-	-	-
Total	100	100	100	100

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E. – Computer Science and Engineering							
60 CP 0P2 - ENGINEERING PHYSICS AND CHEMISTRY LABORATORY (CSE,IT, AIML, EEE,ECE,VLSI)							
Semester	Hours/Week			Total Hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
II	0	0	4	60	2	60	40	100

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

List of Experiments (Physics)*:

1. Determination of Hall coefficient of a given semiconductor and its charge carrier density
2. V-I Characteristics of Zener diode and Solar cell
3. Air wedge - Determination of thickness of a thin sheet/wire
4. a) Laser- Determination of the wave length of the laser using grating
   b) Optical fibre -Determination of numerical aperture and acceptance angle
5. Magnetic field along the axis of current carrying coil – Stewart and Gee

*** SDG: 4- Quality Education**

List of Experiments (Chemistry)*:

1. Estimation of HCl by pH meter.
2. Estimation of mixture of acids by conductivity meter 3. Determination of ferrous ion by Potentiometric titration.
4. Determination of corrosion by weight loss method.
5. Estimation of ferrous ion by spectrophotometer.

*** SDG 6: Improve Clean Water and Sanitation**
*** SDG 9: Industry, Innovation, and Infrastructure**
*** SDG 8: Decent Work and Economic Growth**

Case studies/Activity report

1. Activity using chemdraw software.
2. Activity report on cheminformatic structure.
3. Case study on ion selective electrodes.
4. Assembling of cell or battery.

Lab Manual	
1.	"Engineering Physics Lab Manual", Department of Physics, KSRCT.
2.	"Chemistry Lab Manual Volume I & II", Department of Chemistry, KSRCT.

Course Designer(s) - Physics

4. Dr. V. Vasudevan - vasudevanv@ksrct.ac.in
5. Mr. S. Vanchinathan - vanchinathan@ksrct.ac.in
6. Dr. P. Suthanthira Kumar - suthanthirakumar@ksrct.ac.in

Course Designer(s) - Chemistry

1. Dr.T.A.Sukantha – sukantha@ksrct.ac.in
2. Dr.B.Srividhya - srividyab@ksrct.ac.in
3. Dr.S.Meenachi - meenachi@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 IT 0P1	Python Programming Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To gain the knowledge in Python Programming Language
- To understand the concepts decision making and looping statements
- To implement functions with the aid of modules using exception handling
- To implement the concepts of NumPy Arrays
- To create layouts using graphical modules such as Tkinter and Turtle

Pre-requisites

Basic knowledge of mathematics and programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Implement the basics and data structures of Python programming	Apply
CO2	Implement the concepts of decision making and looping statements	Apply
CO3	Develop programs using functions and modules with exception handling	Apply
CO4	Create programs using NumPy arrays	Apply
CO5	Design layouts with GUI toolkits using Tkinter	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO2	3	2	3	2	-	-	-	-	2	2	2	2	3	3	-
CO3	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO4	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO5	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	25	12	50	50
Apply	25	13	50	50
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

K.S.Rangasamy College of Technology – Autonomous R2022								
60 IT 0P1–Python Programming Laboratory								
Common to CS, IT, AD								
Semester	Hours / Week			Total hrs.	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	0	0	4	60	2	60	40	100

1. Implement the basic concepts of Python
2. Implement List, Tuples, Dictionary, and String
3. Implement the concept of decision-making and looping statements.
4. Working with functions and modules
5. Implement File operations
6. Build a program with Exception handling
7. Perform various NumPy operations and special functions
8. Design windows using Tkinter
9. Draw shapes and images using Turtle
10. Mini Project

Course Designers

1. Dr.C.Nallusamy
2. Mr.R.T.Dinesh Kumar – dineshkumarrt@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

61 CS 2P1	Web Development	Category	L	T	P	Credit
		PC	0	0	2	1

Objectives

- To understand the principles of web design
- To introduce the fundamentals of HTML
- To construct basic websites using HTML
- To apply Cascading Style Sheets
- To develop modern interactive web applications using JavaScript

Pre-requisites

Basic knowledge of programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Describe the concepts of HTML	Apply
CO2	Develop the web pages using HTML	Apply
CO3	Apply CSS features with different layouts	Apply
CO4	Use the JavaScript to develop the dynamic web pages	Apply

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
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CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO5	Develop interactive web applications	Apply

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO2	3	2	3	2	-	-	-	-	2	2	2	2	3	3	-
CO3	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO4	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO5	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
3 – Strong; 2 – Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	25	12	-	-
Apply	25	13	100	100
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
61 CS 2P1 – Web Development								
CS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	0	0	2	30	1	60	40	100
HTML* Web Programming Introduction – HTML Introduction – Basic Formatting Tags - Lists – Images-								[10]

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Hyperlink – Table –Iframe - Form – Headers	
Cascading Style Sheets* CSS Introduction - Syntax - Selectors - Color Background Cursor - Text Fonts – Lists - Tables - Box Model - Display Positioning - CSS Floats.	[10]
JavaScript* Introduction to JavaScript - Advantage of JavaScript - JavaScript Syntax - Datatype - Variable - Array -Operator and Expression - Looping -Constructor - Function - Dialog box – Events JavaScript validation.	[10]
Total Hours	30

Text Book(s):	
1.	Ralph Moseley and Savaliya M T, “Developing Web Applications”, Wiley-India Private Limited, 2011.
2.	Robert W.Sebesta, “Programming the World Wide Web”, 7th edition, Pearson Education, 2013.
Reference(s):	
1.	Kogent Learning Solutions Inc., “Web Technologies Black Book”, Dreamtech Press, 2009.
2.	Joel Sklar, “Principles of Web Design, Cengage Learning”, 6th Edition, 2015.
3.	Paul J. Deitel, Harvey M. Deitel, and Abbey Deitel, “Internet and World Wide Web How to program”, 5th Edition, Pearson Education, 2011.
4.	https://www.w3schools.com/js/

*SDG 4 – Quality Education

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Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Introduction**	
1.1	Introduction to HTML	2
1.2	Basic Formatting Tags	2
1.3	Lists - Images	2
1.4	Hyperlink	2
1.5	Table - Iframe - Form – Headers	2
2	**Cascading Style Sheets**	
2.1	CSS Syntax	2
2.2	Selectors	2
2.3	Color Background Cursor - Text Fonts – Lists - Tables	2
2.4	Box Model - Display Positioning	2
2.5	CSS Floats	2
3	**JavaScript**	
3.1	Introduction to JavaScript, Advantage, Syntax	2
3.2	Datatype - Variable - Array -Operator and Expression	2
3.3	Looping -Constructor	2
3.4	Function - Dialog box	2
3.5	Events - JavaScript validation	2

Course Designer(s)

1. Dr. K. Poongodi - poongodik@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CG 0P1	CAREER SKILL DEVELOPMENT - I	Category	L	T	P	Credit
		CG	0	0	2	1

Objectives

- To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak effectively in English in real life and career related situations
- To equip students with effective speaking and listening skills in English
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively **Pre-requisites**

- Basic knowledge of reading and writing in English

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Listen and comprehend complex academic texts	Understand
CO2	Read and infer the denotative and connotative meanings of technical texts	Analyze
CO3	Write definitions, descriptions, narrations, and essays on various topics	Apply
CO4	Speak fluently and accurately in formal and informal communicative contexts	Apply
CO5	Appraise the verbal ability skills in the career development and professional contexts	Analyze

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	-	2	3	3	2	3	-	-	-
CO2	-	-	-	-	-	-	-	2	3	3	2	3	-	2	-
CO3	-	-	-	-	-	-	-	2	3	3	2	3	-	2	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	-	-	-
CO5	-	-	-	-	-	-	-	2	3	3	2	3	2	2	-
3 - Strong; 2 - Medium; 1 - Some															

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
60 CG 0P1 - Career Skill Development - I								
Common to All Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
					C	CA	ES	Total
	L	T	P					
II	0	0	2	30	1	100	00	100

Listening* Listening for general information-specific details - audio / video (formal & informal) - Listen to podcasts/ TED talks/ anecdotes / stories / event narration / documentaries and interviews with celebrities - Listen to a product and process descriptions, advertisements about products or services.	[6]
Speaking* Self-Introduction; Introducing a friend; conversation - politeness strategies - Narrating personal experiences / events; Interviewing a celebrity; reporting / and summarizing of documentaries / podcasts/ interviews - Picture description; giving instruction to use the product; presenting a product - Small Talk; Mini presentations - Group discussions, debates & role plays.	[6]
Reading* Loud reading vs Silent reading, Skimming & Scanning of passages, reading brochures (technical context), social media messages relevant to technical contexts and emails - Biographies, travelogues, newspaper reports and travel & technical blogs - Advertisements, gadget reviews and user manuals - Newspaper articles and Journal reports - Editorials; and opinion blogs	[6]
Writing* Writing letters – informal and formal – basics and format orientation - paragraph texting, short report on an event (field trip etc.) - Definitions; instructions; and product /process description - Note-making / Note-taking; recommendations; transferring information from non-verbal (charts, graphs to verbal mode) - Essay texting	[6]
Verbal Ability I* Reading Comprehension (MCQs) – Cloze Test - Sequencing of sentences – Summarizing and paraphrase – Error Detection – Spelling Test – Sentence Improvement – Preposition.	[6]
Total Hours	**30**

Text Book(s):	
1.	Michael McCarthy and Felicity O Dell, “English Vocabulary in Use: Upper Intermediate”, Cambridge University Press, N.York, 2012.
2.	Lakshmi Narayanan, “A Course Book on Technical English” Scitech Publications (India) Pvt. Ltd. 2020.
Reference(s):	
1.	“English for Engineers & Technologists” Orient Blackswan Private Ltd. Department of English, Anna University, 2020.
2.	Norman Lewis, “Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book”, Penguin Random House India, 2020.

* SDG:4- Quality Education

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1	**Vehicle Structure and Electronic Engine Systems**	
1.1	Listening for general information and Specific details	**1**
1.2	Listening to podcasts, documentaries and interviews with celebrities	**2**
1.3	Narrating personal experiences	**1**
1.4	Reading relevant to technical contexts and emails	**1**
1.5	Listen to a product and process descriptions	**1**
2	**Speaking**	
2.1	Self-introduction	**1**
2.2	Summarizing of documentaries & Picture Narration	**1**
2.3	Small Talk; Mini presentations	**1**
2.4	Group discussions, debates & role plays.	**2**
2.5	Group discussions	**1**
3	**Reading**	
3.1	Loud reading vs Silent reading, Skimming & Scanning of passages	**2**
3.2	Reading social media messages relevant to technical contexts	**1**
3.3	Reading newspaper reports and travel & technical blogs	**1**
3.4	Reading advertisements, gadget reviews and user manuals	**1**
3.5	Reading newspaper articles and journal reports	**1**
4	**Writing**	
4.1	Writing letters – informal and formal	**2**
4.2	Paragraph Texting	**1**
4.3	Definitions and instructions	**1**
4.4	Note-making / Note-taking	**1**
4.5	Essay texting	**1**
5	**Verbal Ability**	
5.1	Reading Comprehension (MCQs) and Cloze Test	**2**
5.2	Sequencing of sentences	**1**

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.3	Paraphrasing and Summarizing	**1**
5.4	Error Detection and Spelling Test	**1**
5.5	Prepositions	**1**

Course Designer(s)

1. Dr.A.Palaniappan - palaniappan@ksrct.ac.in

K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS
(For the candidates admitted in 2024-2025)

THIRD SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment *	End Semester Exam**	Max. Marks	End Semester Exam	Total
THEORY								
1	60 MA 010	Mathematical Statistics and Numerical Methods	2	40	60	100	45	100
2	60 CS 003	Data Structures	2	40	60	100	45	100
3	60 CS 004	Java Programming	2	40	60	100	45	100
4	60 MY 002	Universal Human Values	2	100	-	100	-	100
THEORY CUM PRACTICAL								
5	61 EC 001	Digital Logic and Microprocessor	2	50	50	100	45	100
6	60 CS 301	Computer Networks	2	50	50	100	45	100
PRACTICAL								
7	61 CS 0P3	Data Structures Laboratory	3	60	40	100	45	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

8	60 CS 0P4	Java Programming Laboratory	3	60	40	100	45	100
9	60 CG 0P2	Career Skill Development – II	1	100	-	100	-	100
10	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination, 50 marks for theory cum practical End Semester Examination and 40 marks for practical End Semester Examination.

60 MA 010	MATHEMATICAL STATISTICS AND NUMERICAL METHODS	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To learn basic concepts of descriptive statistics
- To familiarize various methods in hypothesis testing
- To get exposed to the fundamentals of analysis of variances
- To get exposed to various techniques to solve equations numerically
- To understand the concepts of interpolation and numerical integration

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compute measures of central tendency, measures of dispersion and correlation coefficient.	Apply
CO2	Apply Student's t test, F test and Chi-square test for testing the statistical hypothesis.	Apply
CO3	Apply the concepts of ANOVA to test the equality of means for more than two populations.	Apply
CO4	Employ the various iteration techniques for solving algebraic, transcendental and system of linear equations.	Apply
CO5	Apply different techniques to find the intermediate values and to evaluate definite integrals.	Apply

Mapping with Programme Outcomes

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	40	40	70
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E. – Computer Science and Engineering							
60 MA 010 – Mathematical Statistics and Numerical Methods							
Common to CSE & IT							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	40	60	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Empirical Statistics **Measures of central tendency***: Mean, Median and Mode – Measures of dispersion: Range, Quartile deviation and Standard deviation – Measures of skewness: Bowley's coefficient of skewness and Pearson's co-efficient of skewness – Karl Pearson's coefficient of correlation. **Hands - on:** Calculate mean, median, mode and range for discrete frequency distribution	[9]
Testing of Hypothesis* Type I and Type II errors - Test of significance of small samples : Student's 't' test for single mean - Difference of means – F- test – Chi-square test - Goodness of fit - Independence of attributes. **Hands - on:** Apply Student's t - test, F- test and Chi-square test to real dataset	[9]
Design of Experiments* Analysis of variance: One way classification – Completely randomized design – Two way classification – Randomized block design – Latin square design. **Hands - on:** Perform One-Way ANOVA	[9]
Solution of Equations and Eigen Value Problems Algebraic and Transcendental equations - Newton Raphson method –Regula Falsi method- Gauss elimination method – GaussJordan method– Iterative methods: GaussJacobi method – GaussSeidel method – Eigen value of a matrix by Power method. **Hands - on:** Visualize the iterative methods for solving linear system of equations	[9]
Interpolation and Numerical Integration **Lagrange's and Newton's divided difference interpolation (unequal intervals)- Newton's forward and backward interpolation (equal intervals)** **- Numerical integration: Two point and three point Gaussian quadrature –Trapezoidal, Simpson's1/3 and 3/8 rule (single integral). **Hands - on:** Numerical integration by Trapezoidal and Simpson's rules	[9]
Total Hours: 45 + 5(Hands on) + 10(Tutorial)	**60**

Text Book(s):	
1.	Gupta S. P., "Statistical Methods", 46th Revised Edition, Sultan Chand & Son, New Delhi, 2021.
2.	Faires, J. D. and Burden, R., "Numerical Methods", 4th Edition, Brookes / Cole (Thomson Publications), New Delhi, 2011.
Reference(s):	
1.	Kapoor V. K., and Gupta S. C., "Fundamentals of Mathematical Statistics", 12th Edition, Sultan Chand & sons, New Delhi, 2020.
2.	Johnson, R. A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", 8th Edition, Pearson Education, Asia, 2023.
3.	Grewal, B. S., and Grewal, J. S., "Numerical Methods in Engineering and Science", 10th Edition, Khanna Publishers, New Delhi, 2015.
4.	Kandasamy P., Thilagavathy K. and Gunavathi K., "Numerical Methods", 3rd Edition, S.Chand & Company Ltd, New Delhi, 2003.

*** SDG: 4 - Quality Education,**

****SDG:9 - Industry, Innovation, and Infrastructure**

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1	**Empirical Statistics**	
1.1	Measures of central tendency: Mean and Median	2
1.2	Measures of central tendency Mode	1
1.3	Measures of dispersion: Range	1
1.4	Measures of dispersion: Quartile deviation and Standard deviation	2
1.5	Measures of skewness: Bowley's coefficient of skewness	1
1.6	Measures of skewness:Pearson's coefficient of skewness	1
1.7	Karl Pearson's coefficient of correlation.	1
1.8	Tutorial	2
1.9	Hands on	1
2	**Testing of Hypothesis**	
2.1	Type I and Type II errors	1
2.2	Test of significance of small samples: Student's 't' test for single mean	2
2.3	Test of significance of small samples: Student's 't' test for difference of means	2
2.4	F- test	1
2.5	Chi-square test for Goodness of fit	1
2.6	Chi-square test for Independence of attributes	2
2.7	Tutorial	2
2.8	Hands on	1
3	**Design of Experiments**	
3.1	Analysis of variance: One way classification	2
3.2	Completely randomized design	1
3.3	Two-way classification	2
3.4	Randomized block design	2
3.5	Latin square design.	2
3.6	Tutorial	2
3.7	Hands on	1
4	**Solution of Linear equations and Eigen value problems**	
4.1	Algebraic and transcendental equations	1
4.2	Newton Raphson method	1
4.3	Regula-Falsi method	2
4.4	Gauss Elimination method	1
4.5	Gauss Jordan method	1
4.6	Iterative methods of Gauss Jacobi and Gauss Seidel	2
4.7	Eigen values of a matrix by power method	1
4.8	Tutorial	2
4.9	Hands on	1
5	**Interpolation and Numerical Integration**	
5.1	Lagrange's interpolation	1
5.2	Newton's divided difference interpolation	1
5.3	Newton's forward and backward interpolation	2
5.4	Numerical integration: Two point and three point Gaussian quadrature's	1

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.5	Trapezoidal rule	1
5.6	Simpson’s 1/3 rule,	1
5.7	Simpson’s 3/8 rule	2
5.8	Tutorial	2
5.9	Hands on	1

Course Designer(s)

1. Dr.S. Muthukumar - muthukumar@ksrct.ac.in

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS 003	Data Structures	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To choose the appropriate data structure for a specified application
- To design and implement abstract datatypes such as Linked List, Stack, Queue and Trees
- To Learn and implement the Hashing techniques
- To design a Priority Queue ADT and its applications
- To demonstrate various Sorting, Searching and Graph algorithms

Pre-requisites

Basic knowledge of mathematics and programming language in C

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply linear data structures to solve real time applications.	Apply
CO2	Experiment with trees and its operations.	Apply
CO3	Apply algorithm for solving problems like Sorting and Searching.	Apply
CO4	Implement Priority Queue with its operations and Hashing Techniques.	Apply
CO5	Analyse Shortest Path and Minimum Spanning Tree algorithms and Biconnectivity.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	2	-	-	2	2	-	-	2	3	3	-
CO2	3	3	2	3	2	-	-	2	3	-	-	2	3	3	-
CO3	3	3	2	2	2	2	-	2	3	2	-	2	3	3	-
CO4	3	3	2	3	2	-	-	3	2	2	-	2	3	3	-
CO5	3	3	2	3	2	2	2	3	3	2	-	2	3	3	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	15	20
Apply	40	35	50
Analyse	-	-	20

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS 003 – Data Structures								
Common to CS, IT, EE, AD, AM								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Lists, Stacks and Queues* Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT.	[12]
Trees* Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – B–Trees – B+ Trees.	[9]
Sorting and Searching* Preliminaries – Insertion Sort – Shell Sort – Heap Sort – Merge Sort – Quick Sort – External Sorting – Searching: Sequential Search - Binary Search – Hashed List Searches.	[8]
Hashing and Priority Queues (Heaps) **Hashing – Hash Function – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing – Priority Queues (Heaps)*** – Model – Simple Implementations – Binary Heap–Applications of Priority Queues – d-Heaps.	[7]
Graphs* Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm, Kruskal's Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity.	[9]
Total Hours:	**45**
Text Book(s):	

1.	Weiss M A, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education Asia, 2008.
2.	Langsam Y, Augenstein M J and Tenenbaum A M, "Data Structures using C", Pearson Education Asia, 2009.
Reference(s):	
1.	Rajesh K.Sukla, "Data Structure using C & C++", Wiley India, 2012.
2.	Tannenbaum A, "Data Structure using C", Pearson Education, 2003.
3.	Goodrich and Tamassia, "Data Structures and Algorithms in C++", Second Edition, John Wiley and Sons, 2011
4.	Reema Thareja, "Data Structures using C", Second Edition, Oxford Higher Education, 2014.

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Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Lists, Stacks and Queues**	
1.1	Abstract Data Type (ADT)	2
1.2	List ADT	4
1.3	Stack ADT	3
1.4	Queue ADT	3
2.0	**Trees**	
2.1	Preliminaries	1
2.2	Binary Trees	1
2.3	The Search Tree ADT	1
2.4	Binary Search Trees	1
2.5	AVL Trees	2
2.6	Tree Traversals	1
2.7	B-Trees	1
2.8	B+ Trees	1
3.0	**Sorting and Searching**	
3.1	Preliminaries, Insertion Sort	1
3.2	Shell Sort, Heap sort	1
3.3	Merge Sort	1
3.4	Quick sort	1
3.5	External Sorting	1
3.6	Sequential Searching	1
3.7	Binary Searching	1
3.8	Hashed List Searches	1
4.0	**Hashing and Priority Queues (Heaps)**	
4.1	Hashing, Hash Function	1
4.2	Separate Chaining, Open Addressing	1
4.3	Rehashing, Extendible Hashing	1
4.4	Priority Queues (Heaps)	1
4.5	Simple Implementations, Binary Heap	1
4.6	Applications of Priority Queues	1
4.7	d –Heaps	1
5.0	**Graphs**	

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.1	Graph Definitions - Topological Sort	1
5.2	Shortest-Path Algorithms	1
5.3	Unweighted Shortest Paths	1
5.4	Dijkstra's Algorithm	1
5.5	Minimum Spanning Tree	1
5.6	Prim's Algorithm	1
5.7	Kruskal's Algorithm	1
5.8	Applications of Depth-First Search	1
5.9	Undirected Graphs - Biconnectivity	1

Course Designer(s)

1. Ms.J.Mythili - mythili@ksrct.ac.in

60 CS 004	Java Programming	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To learn object oriented programming concepts
- To understand Java fundamentals and String Methods
- To implement code reduction through packages and collection methods
- To apply the knowledge of Threads and IO streams
- To build applications with JDBC technology for real world problems

Pre-requisites

Basic knowledge of any programming language with ability to solve logical problems

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply Java fundamentals to construct functional programs to solve real-world problems	Apply
CO2	Implement object-oriented principles, exception handling and string operations to solve real world problems	Apply
CO3	Design packages and utilize collections to achieve reusability	Apply
CO4	Apply multithreading concepts and IO Streams in various real world scenario	Apply
CO5	Explore database using regular expression with JDBC	Analyse

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	3	-	-	-	3	3	2	3	3	-	-
CO2	3	3	2	-	3	-	-	2	3	3	2	3	3	2	-
CO3	2	3	3	-	3	-	-	2	3	3	2	3	3	2	-
CO4	3	3	3	2	3	-	-	-	3	3	2	3	3	2	-
CO5	2	3	3	2	3	-	-	-	3	3	2	3	3	-	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	10
Apply	40	40	70
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS 004 – JAVA PROGRAMMING

Common to CS, IT, AD, AM

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

INTRODUCTION OF JAVA FUNDAMENTALS AND OOP* Features of Java, The Java Environment, Java Source File Compilation, Structure of Java, Data Types, Variables, Operators, Control Flow, Arrays, Concepts of ObjectOriented Programming - OOP in Java, Defining classes and methods in Java, constructors, access specifiers, final and static keywords.	[9]
JAVA OOP CONCEPTS AND STRINGS* Java Inheritance, Polymorphism, Interfaces, Abstract class, Exception handling - exception hierarchy, throwing and catching exceptions, built-in exceptions, creating own exceptions, String handling with String and String Buffer classes.	[9]

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

PACKAGES AND COLLECTION FRAMEWORK* Packages – Pre defined and user defined Packages, Boxing and Unboxing, Wrapper classes, Introduction to Collection, The Collection Interfaces – List, Set, Map, Generic Class, Vector, Iterator and ListIterator, String Tokenizer.	[9]
JAVA MULTITHREAD AND I/O STREAMS Multithreaded programming-The Java Thread Model-Lifecycle, The Main Thread, creating a Thread, Creating multiple Threads, Thread priority, Input / Output Basics, Streams, The Byte Streams, The Character Streams, Reading and Writing Console, Reading and Writing Files, Object Serialization and Object De-Serialization.	[9]
JAVA DATABASE CONNECTIVITY AND REGEX Database Programming – Introduction, SQL queries, JDBC, Statement, Prepared Statement**, Regular Expression: Matcher Class, Pattern class and Pattern Syntax, Exception class, Regex Character Classes and Quantifiers, Metacharacters.	[9]
Total Hours	45
Text Book(s):	
1. Herbert Schildt, “Java : The complete Reference”, Comprehensive coverage of the Java language,Oracle press, 12th Edition, Tata McGraw-Hill, 2021.	
2. Vivian Siahaan, Rismon Hasiholan Sianipar, “Java In Practice: JDBC And Database Applications”, 1 Sparta Publishing, Kindle st Edition, 2019.	
Reference(s):	
1. 3 Kathy Sierra ,Bert Bates, “Head First Java”, A Brain Friendly Guide, O’Reilly, nd Edition, 2022.	
2. 11 Cay S.Horstmann, “ Core Java Volume – I Fundamentals”,’ th Edition, 2018.	
3. Daniel Liang Y, “Introduction to Java Programming”, Comprehensive Version,10th Edition, Pearson Education,2015 [JDBC only].	
4. Jeffrey E. F. Friedl, "Mastering Regular Expressions", 3rdEdition, O'Reilly Media, Inc.,2006.	

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**SDG 17 – Global Partnership

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to OOP and Java Fundamentals**	
1.1	Features of Java , The Java Environment	1
1.2	Structure of Java, Data Types, Variables	1
1.3	Operators, Control Flow	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.4	Arrays	1
1.5	Object Oriented Programming - Objects and Classes	1
1.6	OOP in Java	1
1.7	Defining classes and methods in Java	1
1.8	Constructors	1
1.9	Access specifiers, Final, Static Keywords	1
2.0	**Java Concepts and Strings**	
2.1	Java Inheritance	1
2.2	Polymorphism	1
2.3	Interfaces, Abstract class	1
2.4	Exception handling- built-in exceptions	1
2.5	Try, Catch, Finally	1
2.6	Throw, Throws	1
2.7	Creating own exceptions	1
2.8	String Methods	1
2.9	String Buffer	1
3.0	**Packages And Collection Framework**	
3.1	Packages	1
3.2	User defined Packages	1
3.3	Boxing and Unboxing	1
3.4	Wrapper classes	1
3.5	Introduction to Collection	1
3.6	Set, List, Map	2
3.7	Vector	1
3.8	Iterator	1
4.0	**Java Mutltithreading and Stream IO**	
4.1	The Java Thread Model-Lifecycle	1
4.2	The Main Thread	1
4.3	Creating a thread	1
4.4	Creating Multiple Thread	1
4.5	Thread Priority	1
4.6	IO Basics	1
4.7	Reading and Writing Console	1
4.8	Reading and Writing Files	1
4.9	Object Serialization and Object De-Serialization.	1
5.0	**Regex and Java Database Connectivity**	
5.1	Database Programming – Introduction	1
5.2	SQL queries	1

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.3	JDBC	1
5.4	Statement	1
5.5	Prepared Statement	1
5.6	Regular Expression: Matcher Class, Pattern class	1
5.7	Pattern Syntax, Exception class	1
5.8	Regex Character Classes and Quantifiers	1
5.9	Meta characters	1

Course Designer(s)

1. Mr.S.Vadivel – vadivels@ksrct.ac.in

CHAIRMAN
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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

61 EC 001	Digital Logic and Microprocessor	Category	L	T	P	Credit
		ES	2	0	2	3

Objectives

- To learn Boolean algebra and simplification of Boolean functions
- To design and analyze different combinational circuits
- To study the basics of synchronous sequential logic, analyze and design sequential circuits
- To introduce the architecture and programming of 8086 microprocessors
- To perform the interfacing of peripheral devices with 8086 microprocessors

Pre-requisites

- Basic knowledge of Electrical and Electronics Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Simplify complex Boolean functions and design digital systems	Understand
CO2	Design and analyze combinational logic circuits	Analyze
CO3	Design and analyze synchronous sequential logic circuits	Analyze
CO4	Illustrate the architecture of 8086 microprocessor	Understand
CO5	Explain the interfacing techniques of various peripheral devices	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	2					1	1	1	3	2	
CO2	3	3	3	3	2					1	1	1	3	2	
CO3	3	3	3	3	2					1	1	1	3	2	
CO4	3	3	3	3	2					1	1	1	3	2	
CO5	3	3	3	3	2					1	1	1	3	2	

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	20	-
Understand	20	-	20	-	-	30	-
Apply	20	50	10	50	50	20	50
Analyse	10	50	20	50	50	30	50
Evaluate	-	-	-	-	-	-	-

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
61 EC 001 – Digital Logic and Microprocessor								
COMMON TO CS, IT, AD								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	2	0	2	60	3	50	50	100

Digital Fundamentals Review of Number Systems –Binary codes - Boolean postulates and laws – Boolean function - Logic Gates- Universal Gates - Canonical and Standard Forms – Minterms and Maxterms – Sum of Products and Product of Sums - Simplification of Boolean Functions – Karnaugh Map	[6]
Combinational Circuits Design procedure – Adders - Subtractors - Multiplexer / Demultiplexer - Encoder / Decoder – Code Converters	[6]
Sequential Circuits Flip flops SR, JK, T, D and Master Slave – Characteristic table and equation – Analysis of clocked sequential circuits - Ripple counters – Synchronous counters – Modulo-n counters – Registers : Shift registers	[6]
8086 Microprocessor Architecture of 8086 – Execution unit – Bus Interface unit- Addressing modes – Instruction set of 8086: Data transfer Instructions – Branch Instructions - Logical Instructions - Arithmetic Instructions – Shift and rotate Instructions - Simple AssemblyLanguage Programs of 8086	[6]
Peripherals Interfacing Programmable Peripheral Interface (PPI 8255) – Programmable Interval Timer (PIT 8253) – Programmable Interrupt Controller (8259) – Interfacing Serial I /O (8251)	[6]
Practical: 1. Verification of Boolean theorems using logic gates 2. Implementation of combinational circuits using gates for arbitrary functions 3. Implementation of binary adder/subtractor circuits 4. Implementation of code converters 5. Implementation of synchronous counters 6. Implementation of asynchronous counters 7. Implementation of basic arithmetic operations using 8086 8. Implementation of sorting and searching using 8086 9. Interfacing and programming of Programmable Peripheral Interface using 8086	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**
Text Book(s):	
1. M. Morris Mano, Michael D. Ciletti, “Digital Design”, 5th Edition, Pearson Education, New Delhi, 2016.	

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	Soumitra Kumar Mandal, “Microprocessors and Microcontrollers Architecture, Programming & Interfacing Using 8085, 8086 and 8051”, 7th Edition, McGraw Hill India, 2013.
Reference(s):	
1.	Donald P.Leach and Albert Paul Malvino, GoutamSaha, “Digital Principles and Applications” , 7th Edition, Tata McGraw-Hill, New Delhi, 2016.
2.	Charles H.Roth, “Fundamentals of Logic Design”, 5th Edition, Brooks/cole, 2016.
3.	Yu-Cheng Liu, Glenn A. Gibson, “Microcomputer Systems: The 8086/8088 Family- Architecture Programming and Design” , 2nd Edition, Pearson, 2015.
4.	Krishna Kant, “Microprocessors and microcontrollers Architecture , Programming and System design 8085,8086,8051,8096”,PHI-Third Printing, 2010.

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Digital Fundamentals**	
1.1	Review of Number Systems, Binary codes	1
1.2	Boolean postulates and laws, Logic Gates- Universal Gates	1
1.3	Canonical and Standard Forms – Minterms and Maxterms, SOP, POS	1
1.4	Simplification of Boolean Functions	1
1.5	Karnaugh Map	2
2	**Combinational Circuits**	
2.1	Design procedure	1
2.2	Adders , Subtractors	1
2.3	Multiplexer	1
2.4	Demultiplexer	1
2.5	Encoder / Decoder	1
2.6	Code Converters	1
3	**Sequential Circuits**	
3.1	Flip flops SR, JK, T, D	1
3.2	Master Slave, Characteristic table and equation	1
3.3	Analysis of clocked sequential circuits	1
3.4	Ripple counters, Modulo-n counters	1
3.5	Synchronous counters	1
3.6	Registers, Shift registers	1
4	**8086 Microprocessor**	
4.1	Architecture of 8086	1
4.2	Execution unit – Bus Interface unit	1
4.3	Addressing modes	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.4	Instruction set of 8086: Data transfer Instructions	1
4.5	Branch, Logical, Arithmetic, Shift and rotate Instructions,	1
4.6	Simple AssemblyLanguage Programs of 8086	1
5	**Peripherals Interfacing**	
5.1	Programmable Peripheral Interface (PPI 8255)	2
5.2	Programmable Interval Timer (PIT 8253)	2
5.3	Programmable Interrupt Controller (8259)	1
5.4	Interfacing Serial I /O (8251)	1
Practical:		
1.	Verification of Boolean theorems using logic gates	2
2.	Implementation of combinational circuits using gates for arbitrary functions	2
3.	Implementation of binary adder/subtractor circuits	3
4.	Implementation of code converters	4
5.	Implementation of synchronous counters	4
6.	Implementation of asynchronous counters	4
7.	Implementation of basic arithmetic operations using 8086	4
8.	Implementation of sorting and searching using 8086	3
9.	Interfacing and programming of Programmable Peripheral Interface using 8086	4

Course Designer(s)

1. Dr.J.Nithya - nithyaj@ksrct.ac.in

60 CS 301	Computer Networks	Category	L	T	P	Credit
		PC	3	0	2	4

Objectives

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Tiruchengode - 637 215, Namakkal-Dt.

- To understand the computer networking basics and concepts of data communications, functions of different layers
- To Know the standards employed in computer networking
- To make the students to get familiarized with different protocols and network components
- To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications
- To understand the application layer and its applications

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the concept of components, categories and ISO/OSI model of networks	Understand
CO2	Analyse the various error detection techniques and Flow, Error control	Analyse
CO3	Compare the concept of Circuit switching and Packet switching	Apply
CO4	Apply the knowledge of Congestion control and QoS Techniques	Apply
CO5	Analyse the Purpose of Domain Name Space, Email and FTP	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	-	-	-	-	-	-	-	-	2	-	-	-
CO2	3	3	3	2	-	-	-	-	-	-	-	2	3	2	-
CO3	3	3	3	2	3	-	-	3	3	3	-	2	3	2	-
CO4	3	3	3	-	2	-	2	-	-	-	-	2	-	2	-
CO5	3	2	3	-	2	-		2	2	2	-	2	2	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	20	-
Understand	10	-	30	-	-	20	-
Apply	20	50	20	50	50	30	50
Analyse	20	50	-	50	50	30	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 CS 301 – Computer Networks							
CS							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
III	3	0	2	75	4	50	50	100

Data Communications Networks – Components and Categories –Line Configuration – Topologies –Protocols and Standards –ISO/OSI model–Transmission Media–Coaxial Cable–Fiber Optics– Interfaces (RS232 Standard) and Modems - Connecting devices - Repeaters- HubsBridges.	[12]
Data Link Layer Error – detection and correction – Parity – LRC – CRC – Hamming code – Flow Control and Error control –Stop and wait – go back-N ARQ – selective repeat ARQ- sliding window – HDLC. - LAN - Ethernet IEEE 802.3	[9]
Network Layer Internetworks – Circuit Switching – Packet Switching– IP addressing methods- Classification of IP Address – Sub netting – Problem Solving using IP Addressing – Super netting–Routers- Routing Algorithms – Distance Vector Routing – Link State Routing- ICMP / Frame format, Query Messages.	[7]
Transport Layer Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) –Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS)-Techniques.	[7]
Application Layer* Domain Name Space (DNS) – Email (SMTP) – File Transfer protocol (FTP) – HTTP – HTTPS – World Wide Web. **Case Study*:** Structural Health Monitoring, Traffic Control, Health Care, Pipeline Monitoring, Precision Agriculture.	[10]
Practical: 1. Analyze the performance of various configurations and protocols in LAN 2. Construct a VLAN and make the PC's communicate among a VLAN 3. Construct an Inter-VLAN and make the PC's communicate among a VLAN 4. Construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP) 5. Understand the concept and operation of Routing Information Protocol (RIP) 6. Construct multiple router networks and understand the operation of OSPF protocol **7.** Understand the operation of SSH by accessing the routers remotely by PCs **Case Study*:** Structural Health Monitoring, Traffic Control, Health Care, Pipeline Monitoring, Precision Agriculture.	[30]
Total Hours: (Lecture - 45; Practical - 30)	75
Text Book(s):	

1.	Behrouz A.Forouzan,"Data communication and Networking Update", Tata McGraw-Hill, Third Edition, 2006.

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education, 2003.
Reference(s):	
1.	John Mark Comer, “Internetworking with TCP/IP”, 6th Edition, Pearson Education, 2015.
2.	Larry L. Peterson and Peter S.Davie, “Computer Networks”, Harcourt Asia Pvt. Ltd., Second Edition.
3.	Andrew S.Tanenbaum, “Computer Networks”, PHI, Fourth Edition, 2003.
4.	William Stallings, “Data and Computer Communication”, Sixth Edition, Pearson Education, 2000.

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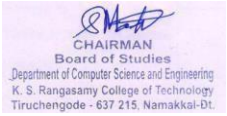
Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Data Communications**	
1.1	Networks, Components and Categories	1
1.2	Line Configuration, Topologies	1
1.3	Protocols and Standards	1
1.4	ISO/OSI model	2
1.5	Transmission Media	1
1.6	Coaxial Cable	1
1.7	Fiber Optics	1
1.8	Interfaces (RS232 Standard) and Modems	1
1.9	Connecting devices	1
1.10	Repeaters – Hubs - Bridges.	2
2	**Data Link Layer**	
2.1	Error – detection and correction	1
2.2	Parity, LRC, CRC, Hamming code	2
2.3	Flow Control and Error control	1
2.4	Stop and wait, go back-N ARQ, selective repeat ARQ	2
2.5	Sliding window, HDLC, LAN	1
2.6	Ethernet IEEE 802.3	1
2.7	Connecting devices – Repeaters – Hubs - Bridges	1
3	**Network Layer**	
3.1	Internetworks, Circuit Switching, Packet Switching	1
3.2	IP addressing methods, Sub netting, Super netting, Routers	1
3.3	Routers, Routing Algorithms	1
3.4	Distance Vector Routing	1
3.5	Link State Routing	1
3.6	ICMP / Frame format	1
3.7	Query Messages	1



4	**Transport Layer**	
4.1	Duties of transport layer	1
4.2	Multiplexing, Demultiplexing	1
4.3	Sockets	1
4.4	User Datagram Protocol (UDP)	1
4.5	Transmission Control Protocol (TCP)	1
4.6	Congestion Control	1
4.7	Quality of services (QOS) -Techniques	1
5	**Application Layer**	
5.1	Domain Name Space(DNS)	2
5.2	Email(SMTP)	2
5.3	File Transfer protocol(FTP)	2
5.4	HTTP, HTTPS	2
5.5	World Wide Web	2
Practical:		
1.	Analyze the performance of various configurations and protocols in LAN	5
2.	Construct a VLAN and make the PC's communicate among a VLAN	5
3.	Construct an Inter-VLAN and make the PC's communicate among a VLAN	4
4.	Construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP)	4
5.	Understand the concept and operation of Routing Information Protocol (RIP)	4
6.	Construct multiple router networks and understand the operation of OSPF protocol	4
7.	Understand the operation of SSH by accessing the routers remotely by PCs	4

Course Designer(s)

1. Dr. P.Senthilraja- senthilraja@ksrct.ac.in

60 MY 002	Universal Human Values	Category	L	T	P	Credit
		MC	3	0	0	3*

Objectives

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

- To identify the essential complementarily between 'values' and 'skills' To ensure core aspirations of all human beings.
- To acquire ethical human conduct, trustful and mutually fulfilling human behaviour
- To enrich interaction with Nature
- To achieve holistic perspective towards life and profession

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the significance of value inputs in formal education and start applying them in their life and profession	Understand
CO2	Evaluate coexistence of the “I” with the body.	Analyze
CO3	Identify and evaluate the role of harmony in family, society and universal order.	Analyze
CO4	Classify and associate the holistic perception of harmony at all levels of existence and Nature	Analyze
CO5	Develop appropriate human conduct and management patterns to create harmony in professional and personal lives.	Create

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	-	3	2	-	2	3	-	-	-
CO2	-	-	-	-	-	3	-	3	3	-	-	3	-	-	-
CO3	-	-	-	-	-	3	3	3	3	-	-	3	-	-	-
CO4	-	-	-	-	-	3	3	3	3	-	-	3	-	-	-
CO5	-	-	-	-	-	3	3	3	3	3	-	3	-	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom’s Category	Continuous Assessment Tests (Marks)		**End Sem Examination (Marks)**
	1	2	
Remember	10	10	No End Semester Examination
Understand	10	10	
Apply	20	20	
Analyse	20	20	
Evaluate	-	-	
Create	-	-	
Total	60	60	

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 MY 002 - UNIVERSAL HUMAN VALUES								
Common to all Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3*	100	0	100

Introduction to value Education * Understanding value Education-Self exploration as the process for value educationContinuous Happiness and prosperity-the basic human aspirations-right understandingrelationship and physical facility –happiness and prosperity - current scenario – **method to fulfill the basic human aspirations****	[9]
Harmony in the Human Being* Understanding Human being as the Co-Existence of the self and the Body-Distinguishing between the needs of the self and the body-the body as an instrument of the self**understanding harmony in the self-harmony of the self with the body**** – programme to ensure self-regulation and health.	[9]
Harmony in the Family and Society* Harmony in the Family –the basic unit of human interaction-values in human- to - human relationship –'Trust' the foundation value in relationship –'Respect'- as the right evaluationunderstanding harmony in the society –vision for the universal human order.	[9]
Harmony in the Nature/Existence* Understanding harmony in the Nature-Interconnectedness, self-regulation and mutual fulfillment among the four orders of nature – realizing existence as co-existence at all levels – the holistic perception of harmony in existence.	[9]
Implications of the Holistic Understanding* Natural Acceptance of human values- definitiveness of human conduct- a basis for humanistic education, humanistic constitution and universal human order- competence in professional ethics –holistic technologies, production systems and management modelstypical case studies – strategies for transition towards value base life and profession.	[9]
Total Hours	**45**
Text Book(s):	

1.	Gaur R R, Asthana R, Bagaria G P, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	Gaur R R, Asthana R, Bagaria G P, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-938703453-2
Reference(s):	
1.	Nagaraj A, "Jeevan Vidya: EkParichaya", Jeevan Vidya Prakashan, Amarkantak, 1999.
2.	Tripathi A N, "Human Values", New Age International. Publishers, New Delhi, 2004.

*SDG 9 – Industry Innovation and Infrastructure **SDG 3 – Good Health and Well Being

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**INTRODUCTION TO VALUE EDUCATION**	
1.1	Discussion on Present Education System and Skill Based Education	1
1.2	Understanding Value Education	1
1.3	Self exploration as the process for value education	1
1.4	Basic Human Aspirations - Continuous Happiness and Prosperity	1
1.5	Basic requirements to fulfill Human Aspirations - Right understanding, Relationship and Physical facility	1
1.6	Transformation from Animal Consciousness to Human Consciousness	1
1.7	Sources of Happiness and Prosperity – Harmony and Disharmony	1
1.8	Current Scenario and Role of Education	1
1.9	Outcome of Human Education and Method to fulfill the basic human aspirations	1
2	**HARMONY IN THE HUMAN BEING**	
2.1	Understanding Human being - As Co-Existence of the self and the Body – The Needs of the Self and the Body	1
2.2	Understanding Human being - As Co-Existence of the self and the Body - The Activities and Response of the Self and the Body	2
2.3	The body as an instrument of the self	1
2.4	Understanding harmony in the self	1
2.5	Harmony of the self with the body	2
2.6	Programme to ensure self-regulation and health	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.7	My Participation (Value) regarding Self and my Body - Correct Appraisal of our Physical needs	1
3	**HARMONY IN THE FAMILY AND SOCIETY**	
3.1	Harmony in the Family - Understanding Values in Human Relationships	1
3.2	Family as the basic Unit of Human Interaction	1
3.3	Values in human Relationships	1
3.4	Trust - the foundation value in relationship	1
3.5	Respect as the right evaluation, the Basis for Respect, Assumed Bases for Respect today	1
3.6	Harmony from Family to World Family: Undivided Society	1
3.7	Extending Relationship from family to society , Identification of the Comprehensive Human Goal	1
3.8	Programs needed to achieve the Comprehensive Human Goal: The Five Dimensions of Human Endeavour	1
3.9	Harmony from Family Order to World Family Order – Universal Human Order	1
4	**HARMONY IN THE NATURE / EXISTENCE**	
4.1	The Four Orders in Nature	1
4.2	Participation of Human Being in Entire Nature	1
4.3	Natural Characteristics - Tendency of Human Living with Animal Consciousness / The Holistic Perception of Harmony in Existence	1
4.4	Present day Problems	1
4.5	Recyclability and self-regulation in Nature	1
4.6	Relationship of Mutual Fulfillment	1
4.7	An Introduction to space, Co-existence of Units in Space	1
4.8	Harmony in Existence – Understanding Existence as Co- Existence	1
4.9	Natural Characteristic of Human Living with Human Consciousness	1
5	**IMPLICATIONS OF THE HOLISTIC UNDERSTANDING**	
5.1	Natural Acceptance of human values	1
5.2	Definitiveness of Ethical Human Conduct - Development of Human Consciousness	1
5.3	Identification of Comprehensive Human Goal	1
5.4	Basis for Humanistic Education and Humanistic Constitution	1
5.5	Ensuring Competence in professional Ethics	1
5.6	Issues in Professional Ethics-The Current Scenario	1
5.7	Holistic Technologies and Production Systems and management models -Typical Case Studies	2
5.8	Strategies for transition towards value based life and profession	1

Course Designer(s)

1. Dr.G.Vennila- vennila@ksrct.ac.in
2. Dr.K.Raja- rajak@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

61 CS 0P3	Data Structures Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To design and implement simple linear and nonlinear data structures
- To strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To program for storing data as tree structure and implementation of various traversal techniques
- To implement sorting and searching techniques

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

- To gain knowledge of hashing techniques and graph applications

Pre-requisites

Programming knowledge in C language

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Demonstrate the implementation of Linear Data structures and its applications	Apply
CO2	Investigate Balanced Parenthesis and Postfix expressions with the help of Stack ADT	Apply
CO3	Implement Non-Linear Data Structure	Apply
CO4	Implement sorting and searching techniques	Apply
CO5	Implement Hashing Techniques, Shortest Path and Minimum Spanning Tree Algorithm	Analyse

Mapping with Programme Outcomes

Cos	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	-	-	-	-	2	-	-	2	3	3	-
CO2	3	3	2	3	-	-	-	-	3	-	-	2	3	3	-
CO3	3	3	2	2	2	2	-	-	3	2	-	2	3	3	-
CO4	3	3	2	3	2	-	-	3	2	2	-	2	3	3	-
CO5	3	3	2	-	2	2	2	3	3	2	-	2	3	3	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)	
	Lab	Activity			
Remember	-	-	-	-	-
Understand	-	-	-	-	-
Apply	40	15	80	-	80
Analyse	10	10	20	-	20
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

61 CS 0P3 – Data Structures Laboratory								
Common to CS, IT, EE, AD, AM								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	0	0	4	60	2	60	40	100

List of Experiments:

1. Implementation of List Abstract Data Type (ADT)*
2. Implementation of Stack ADT*
3. Implementation of Queue ADT*
4. Implementation of stack applications: *

   (a) Program for 'Balanced Parenthesis'

   (b) Program for 'Evaluating Postfix Expressions'
5. Implementation of Search Tree ADT*
6. Implementation of Sorting Algorithms*
7. Develop a program for various Searching Techniques *
8. Implementation of Hashing Techniques *
9. Implementation of Shortest Path Algorithm*
10. Implementation of Minimum Spanning Tree Algorithm*

*SDG 4 – Quality Education

Course Designer(s)

1. Dr. K. Poongodi – poongodik@ksrct.ac.in

60 CS 0P4	**Java Programming Laboratory**	**Category**	**L**	**T**	**P**	**Credit**
		PC	**0**	**0**	**4**	**2**

Objectives

- To apply core Java concepts to solve real-world problems
- To implement object-oriented programming (OOP) principles

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

- To apply exception Handling, Strings, and Collections to manipulate strings and data efficiently
- To apply the knowledge of Threads and IO streams
- To create a JDBC-integrated mini project that applies a wide range of Java concepts

Pre-requisites

Basic knowledge of any programming language with ability to solve logical problems

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Demonstrate Java fundamentals to solve real world problems	Apply
CO2	Design applications involving Object Oriented Programming concepts such as inheritance, polymorphism, abstract classes and interfaces	Apply
CO3	Implement Java Applications using Strings, Collections and exception Handling	Apply
CO4	Develop concurrent and input/output-intensive applications using Threads and IO streams	Apply
CO5	Develop a JDBC-integrated mini project to provide extensible software solutions	Analyze

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	3	-	-	-	3	3	2	3	3	-	-
CO2	3	3	2	-	3	-	-	2	3	3	2	3	3	2	-
CO3	2	3	3	-	3	-	-	2	3	3	2	3	3	2	-
CO4	3	3	3	2	3	-	-	-	3	3	2	3	3	2	-
CO5	2	3	3	2	3	-	-	-	3	3	2	3	3	-	-
3 – Strong; 2 – Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	25	12	50	50
Analyse	25	13	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS 0P4–Java Programming Laboratory								
Common to CS, IT, AD, AM								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	0	0	4	60	2	60	40	100

List of Experiments:

1. Implementation of java fundamentals to solve real world problems*
2. Demonstrate Class and method, Constructor and Inheritance *
3. Demonstrate Polymorphism, Abstract and Interface*
4. Implementation of Exception Handling to check abnormal condition*
5. Implementation of String and String Buffer*
6. Demonstrate various methods of Collection and Iterator*
7. Implementation of multithreading and IO Streams*
8. Implementation of Database Connectivity using JDBC**

Mini project: Develop an application using the concepts of Inheritance, Polymorphism, Interfaces, Packages, Exception handling and collections along with JDBC.

*SDG 4 – Quality Education
**SDG 17 – Global Partnership

Course Designer(s)

1. Mr. S. Vadivel- vadivels@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CG 0P2	CAREER SKILL DEVELOPMENT II	Category	L	T	P	Credit
		CG	0	0	2	1

Objectives

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts.
- To help learners develop strategies that could be adopted while reading texts.
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations.
- Improve listening, observational skills, and problem-solving capabilities
- Develop message generating and delivery skills

Pre-requisites

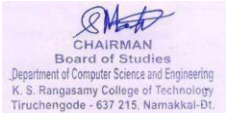
Basic knowledge of reading and writing in English.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compare and contrast products and ideas in technical texts.	Analyze
CO2	Identify cause and effects in events, industrial processes through technical texts	Analyze
CO3	Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Analyze
CO4	Report events and the processes of technical and industrial nature.	Apply
CO5	Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Apply

Mapping with Programme Outcomes



COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	-	2	3	3	2	3	-	-	2
CO2	-	-	-	-	-	-	-	2	3	3	2	3	-	2	2
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	2	2
CO4	-	-	-	-	-	-	-	2	3	3	2	3	2	-	2
CO5	-	-	-	-	-	-	-	2	3	3	2	3	-	2	2
3 - Strong; 2 - Medium; 1 - Some															

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 CG 0P2 - Career Skill Development II							
Common to All Branches							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
III	0	0	2	30	1	100	00	100
Listening* Evaluative Listening: Advertisements, Product Descriptions, - Audio / video; filling a graphic organiser (choosing a product or service by comparison) - Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects, documentaries depicting a technical problem and suggesting solutions - Listening to TED Talks							**[6]**

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Speaking* Marketing a product, persuasive speech techniques - Describing and discussing the reasons of accidents or disasters based on news reports, Group Discussion (based on case studies), presenting oral reports, Mini presentations on select topics with visual aids, participating in role plays, virtual interviews	**[6]**
Reading* Reading advertisements, user manuals and brochures - longer technical texts– cause and effect essays, and letters / emails of complaint - Case Studies, excerpts from literary texts, news reports etc. - Company profiles, Statement of Purpose (SoPs)	**[6]**
Writing* Professional emails, Email etiquette - compare and contrast essay - Writing responses to complaints Precis writing, Summarizing and Plagiarism- Job / Internship application – Cover letter & Résumé	**[6]**
Verbal Ability II* Reading Comprehension (Inferential fillups) – Spotting Errors – Verbal Analogies – Theme Detection – Change of Voice – Change of Speech – One word substitution	**[6]**
Total Hours	**30**

Text Book(s):	
1.	"English for Engineers & Technologists", Orient Blackswan Private Ltd. Department of English, Anna University, 2020.
2.	Norman Lewis, "Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book", Penguin Random House India, 2020.
Reference(s):	
1.	Raman. Meenakshi, Sharma. Sangeeta, "Professional English", Oxford University Press., New Delhi, 2019.
2.	Arthur Brookes and Peter Grundy, "Beginning to Write: Writing Activities for Elementary and Intermediate Learners", Cambridge University Press, New York, 2003.

*SDG 4 – Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Listening**	
1.1	Evaluative Listening: Advertisements, Product Descriptions	1
1.2	Listening to longer technical talks and completing– gap filling exercises.	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.3	Listening technical information from podcasts	1
1.4	Listening to process/event descriptions to identify cause & effects and documentaries depicting a technical problem and suggesting solutions	2
1.5	Listening to TED Talks	1
2	**Speaking**	
2.1	Marketing a product, persuasive speech techniques	1
2.2	Describing and discussing the reasons of accidents or disasters based on news reports,	2
2.3	Group Discussion (based on case studies)	1
2.4	Presenting oral reports, Mini presentations on select topics with visual aids	1
2.5	participating in role plays and virtual interviews	1
3	**Reading**	
3.1	Reading advertisements, user manuals and brochures	1
3.2	Reading - longer technical texts– cause and effect essays, and letters / emails of complaint	2
3.3	Case Studies, excerpts from literary texts, news reports etc.	1
3.4	Company profiles	1
3.5	Statement of Purpose (SoPs)	1
4	**Writing**	
4.1	Professional emails, Email etiquette	1
4.2	Compare and contrast essay	1
4.3	Writing responses to complaints	1
4.4	Precis writing, Summarizing and Plagiarism	2
4.5	Job / Internship application – Cover letter & Résumé	1
5	**Verbal Ability II**	
5.1	Reading Comprehension (Inferential fillups) and Theme Detection	2
5.2	Spotting Errors	1
5.3	Verbal Analogies	1
5.4	Change of Voice and Change of Speech	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.5	One word substitution	1

Course Designer(s)

1. Dr.A.Palaniappan- palaniappan@ksrct.ac.in

K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS
(For the candidates admitted in 2024-2025)

FOURTH SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment *	End Semester Exam Max. Marks **		End Semester Exam	Total
THEORY								
1	60 MA 017	Discrete Mathematics	2	40	60	100	45	100
2	60 IT 002	Design and Analysis of Algorithms	2	40	60	100	45	100
3	61 CS 401	Advanced Web Development	2	40	60	100	45	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4	61 CS 402	Database Management Systems	2	40	60	100	45	100
5	60 OE L0*	Open Elective – I	2	40	60	100	45	100
THEORY CUM PRACTICAL								
6	60 CS 403	Software Engineering	2	50	50	100	45	100
PRACTICAL								
7	61 CS 4P1	Advanced Web Development Laboratory	3	60	40	100	45	100
8	61 CS 4P2	Database Management Systems Laboratory	3	60	40	100	45	100
9	60 CG 0P3	Career Skill Development – III	1	100	-	100	-	100
10	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination, 50 marks for theory cum practical End Semester Examination and 40 marks for practical End Semester Examination.

60 MA 017	Discrete Mathematics	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To get exposed to logical arguments and construct simple mathematical statements
- To familiarize the basic concepts of set theory
- To get exposed to different types of functions
- To provide fundamental principles of combinatorial counting techniques
- To familiarize the basic concepts of graph theory

Pre-requisites

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Describe the logical arguments and construct simple mathematical statements	Apply
CO2	Apply the basics of set theory to the situations involving inclusion and exclusion.	Apply
CO3	Describe the concepts of different types of functions.	Apply
CO4	Apply permutation and combination in real time situations and solve recurrence relations.	Apply
CO5	Employ the basics of graph theory in computer networks.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	40	40	70
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
60 MA 017 - Discrete Mathematics								
Common to CSE & IT								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	3	1	0	60	4	40	60	100

MATHEMATICAL LOGIC *, ** Propositional logic - Propositional equivalences - Predicates and quantifiers - Rules of inference. **Hands-on:** Generate the truth table for mathematical logic	[9]
SET THEORY *, ** Algebra of sets - The power set - Ordered pairs and Cartesian product - Principle of inclusion and Exclusion - Relations on sets -Types of relations and their properties - Equivalence relations - Relational matrix and the graph of relation - Operations on relations. **Hands-on:** Compute various functions for set operations like union and intersection	[9]
FUNCTIONS *, ** Functions -Types of functions - Injective, surjective and bijective functions - Composition of functions - Inverse functions - Primitive recursive functions - Permutation functions. **Hands-on:** Find the composition of functions	[9]
COMBINATORICS *, ** Permutations and Combinations - Pigeonhole principle - Mathematical induction - Recurrence relations - Generating functions. **Hands-on:** Compute permutations and combinations	[9]
GRAPH THEORY *, *** Graphs - Types of graphs - Matrix representation of graphs - Graph isomorphism - Walk - Path - Cycles - Eulerian graphs - Hamiltonian graphs - Planar graphs - Euler formula - Shortest path algorithm: Dijkstra's Algorithm. **Hands-on:** Solve the problem about isomorphism of two graphs	[9]
Total Hours: 45 + 5(Hands-on) + 10(Tutorial)	**60**

Text Book(s):	
1.	Grimaldi R P, "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2014.
2.	Tremblay J P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", McGraw–Hill Education Private Limited, New Delhi, 49th reprint 2016.
Reference(s):	
1.	Rosen K H, "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
2.	Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", Fourth Indian reprint, Pearson Education Pvt Ltd., New Delhi, 2003.

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.	Veerarajan T, “Discrete Mathematics with Graph Theory and Combinatorics” Fifth Reprint, Tata McGraw Hill Publishing Company Limited, 2008.
4.	Lipschutz S, Lipson M and Patil V .H, "Discrete Mathematics", 3rd Edition, Schaum‘s Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 2010.

***SDG 4: Quality education.**

****SDG 9: Promote inclusive and sustainable industrialization.**

***** SDG12: Production Patterns.**

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**MATHEMATICAL LOGIC**	
1.1	Propositional logic	2
1.2	Propositional equivalences	2
1.3	Rules of inference	2
1.4	Predicate	1
1.5	Quantifiers	2
1.6	Tutorial	2
1.7	Hands-on	1
2	**SET THEORY**	
2.1	Algebra of sets	1
2.2	The power set , Ordered pairs and Cartesian product	1
2.3	Principle of inclusion and exclusion	2
2.4	Types of relations and their properties	1
2.5	Equivalence relations	2
2.6	Relational matrix and the graph of relation	1
2.7	Operations on relations	1
2.8	Tutorial	2
2.9	Hands-on	1
3	**FUNCTIONS**	
3.1	Functions	1
3.2	Types of functions	1
3.3	Composition of functions	1
3.4	Inverse functions	2

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.5	Primitive recursive functions	2
3.6	Permutation functions	2
3.7	Tutorial	2
3.8	Hands-on	1
4	**COMBINATORICS**	
4.1	Permutations and Combinations	2
4.2	Pigeonhole principle	1
4.3	Mathematical induction	2
4.4	Recurrence relations	2
4.5	Generating functions	2
4.6	Tutorial	2
4.7	Hands-on	1
5	**GRAPH THEORY**	
5.1	Types of graphs	1
5.2	Matrix representation of graphs	1
5.3	Graph isomorphism	2
5.4	Eulerian graphs and Hamiltonian graphs	2
5.5	Planar graphs and Euler formula	2
5.6	Shortest path algorithm: Dijkstra's Algorithm	1
5.7	Tutorial	2
5.8	Hands-on	1

Course Designer(s)

1. Dr.K.Kiruthika – kiruthika@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 IT 002	Design and Analysis of Algorithms	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To design algorithms in both the science and practice of computing.
- To choose the appropriate data structure and algorithm design method for a specified Application
- To understand how the choice of data structures and algorithm design methods impacts the performance of programs.
- To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.
- To solve NP-hard and NP-complete problems.

Pre-requisites

Basic knowledge of Data Structures and Computer programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Classify the problem types and compare orders of growth to represent asymptotic notations	Understand

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO2	Apply and inspect recursive and non-recursive algorithms by mathematical notations using sample algorithms.	Analyze
CO3	Apply 'Brute Force' and 'Divide and conquer' design techniques for sorting and searching problems	Analyze
CO4	Construct analogous algorithms for graph related problems.	Understand
CO5	Apply 'Backtracking' and 'Branch and bound' techniques to solve NPhard problems.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	2	-	-	-	-	-	2	-	-	3	2	-
CO2	3	3	3	2	-	-	-	-	-	2	-	-	3	2	-
CO3	3	3	3	2	3	-	-	-	-	2	-	-	3	2	-
CO4	3	3	3	2	-	-	-	-	-	2	-	-	3	2	-
CO5	3	3	3	2	3	-	-	-	-	2	-	-	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	-	-	10
Understand	20	20	20
Apply	20	20	30
Analyse	20	20	40
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E. – Computer Science and Engineering							
60 IT 002 - Design and Analysis of Algorithms							
Common to CS, IT							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

IV	3	0	0	45	3	40	60	100

Basic Concepts of Algorithms * Introduction - Fundamentals of Algorithmic Problem Solving - Important Problem types Fundamentals of the analysis of algorithm efficiency - Analysis Framework - Asymptotic Notations and Basic Efficiency Classes - Recurrence relations: Methods for solving recurrence relations.	**[9]**
Mathematical Analysis of Algorithms * Mathematical Analysis of Non-recursive Algorithms and Examples - Mathematical Analysis of Recursive Algorithms - Example: Fibonacci numbers - Empirical Analysis of Algorithms.	**[9]**
Brute Force and Divide & Conquer Techniques* Selection Sort and Bubble Sort - Brute-force string matching - Merge sort - Multiplication of Two n-Bit Numbers - Quick Sort - Binary Search - Binary tree Traversal and Related Properties.	**[9]**
Algorithm Design Paradigm* Decrease and Conquer Technique: Insertion Sort - Depth first Search and Breadth First Search – Transform and Conquer Technique: Presorting - Dynamic Programming: Computing a Binomial Coefficient - Warshall's and Floyd's Algorithm - The Knapsack Problem and Memory Functions - Optimal Binary Search trees – Greedy Technique: Huffman trees.	**[9]**
NP Hard and NP-Complete Problems* P and NP problems - NP complete problems - Backtracking: N-Queen's Problem - Hamiltonian Circuit Problem Branch and Bound Techniques: Traveling salesman problem.	**[9]**
Total Hours	**45**

Text Book(s):	
1.	Anany Levitin, "Introduction to the Design and Analysis of Algorithm", 3rd Edition, Tenth Impression, Pearson Education Asia, 2017.
2.	Cormen T H, Leiserson C E, Rivest R L and Stein C, "Introduction to Algorithms", 3rd Edition, PHI Pvt. Ltd., 2012.
Reference(s):	
1.	Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", Pearson Education Asia, 2010.
2.	Aho A V, Hopcroft J E and Ullman J D, "The Design and Analysis of Computer Algorithms", Pearson Education Asia, 2003.
3.	Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, "Computer Algorithms/ C++", 2nd Edition, Universities Press, 2007.
4.	Anany Levitin, "Introduction to the Design & Analysis of Algorithms", 2nd Edition, Pearson Education, 2011.

*SDG 4 – Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Basic Concepts of Algorithms**	

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.1	Fundamentals of Algorithmic Problem Solving	1
1.2	Important Problem types	1
1.3	Fundamentals of the analysis of algorithm efficiency	1
1.4	Analysis Framework	1
1.5	Asymptotic Notations	1
1.6	Asymptotic Notations and Basic Efficiency Classes	1
1.7	Recurrence relations	1
1.8	Methods for solving recurrence relations.	2
2	**Mathematical Analysis of Algorithms**	
2.1	Mathematical Analysis of Non-recursive Algorithms	2
2.2	Non-recursive Algorithms and Examples	2
2.3	Mathematical Analysis of Recursive Algorithms	2
2.4	Fibonacci numbers	1
2.5	Empirical Analysis of Algorithms.	2
3	**Brute Force and Divide & Conquer Techniques**	
3.1	Selection Sort	1
3.2	Bubble Sort	1
3.3	Brute-force string matching	1
3.4	Merge sort	1
3.5	Multiplication of Two n-Bit Numbers	1
3.6	Quick Sort	1
3.7	Binary Search	1
3.8	Binary tree Traversal	2
4	**Algorithm Design Paradigm**	
4.1	Decrease and Conquer Technique: Insertion Sort	1
4.2	Depth first Search and Breadth First Search	1
4.3	Transform and Conquer Technique: Presorting	1
4.4	Dynamic Programming: Computing a Binomial Coefficient	1
4.5	Warshall's and Floyd's Algorithm	1
4.6	The Knapsack Problem and Memory Functions	1
4.7	Optimal Binary Search trees	1
4.8	Greedy Technique: Huffman trees.	2
5	**NP Hard and NP-Complete Problems**	
5.1	P and NP problems	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.2	NP complete problems	1
5.3	Backtracking: N-Queen's Problem	2
5.4	Hamiltonian Circuit Problem	2
5.5	Branch and Bound Techniques	1
5.6	Traveling salesman problem.	2

Course Designer(s)

1. Dr.C.Rajan- rajan@ksrct.ac.in

CHAIRMAN
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61 CS 401	Advanced Web Development	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To learn the concepts of scripting languages and client side programming in JavaScript To learn the concepts of jQuery
- To learn the concepts of TypeScript
- To learn the concepts of MySQL
- To make aware of the students about development in React JS

Pre-requisites

HTML, CSS

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Implement the concepts of JavaScript to create a web page	Apply
CO2	Implement the concepts of jQuery	Apply
CO3	Apply the concepts of TypeScript	Apply
CO4	Develop dynamic web applications using MySQL	Apply
CO5	Apply the concepts of React JS to create a dynamic and interactive web page	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	-	3	-	-	-	3	3	2	3	3	-	-
CO2	3	2	3	-	3	-	-	-	3	3	2	3	3	-	-
CO3	3	2	3	-	3	-	-	-	3	3	2	3	3	-	-
CO4	3	2	3	-	3	-	-	-	3	3	2	3	3	-	-

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO5	3	2	3	-	3	-	-	-	3	3	2	3	3	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	30
Apply	40	40	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
61 CS 401 – Advanced Web Development								
CS								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100
Advanced Java Script Introduction to JavaScript–JavaScript DOM Model-Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript.								[9]
JQUERY * Introduction to jQuery – jQuery Selectors – jQuery Events- jQuery Effects – jQuery HTML – jQuery AJAX.								[9]
TYPESCRIPT* Introduction – TS Types – Arrays – Tuples – Object Types – Union Types – Functions – Classes – Utility Types – TS Keyof								[9]

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

MySQL and WebServer** Basic SQL – Setting Up a MySQL User Account – Creating Databases in MySQL – Web Server – Introduction – HTTP Transactions – Multitier Application Architecture – ClientSide Scripting versus Server-Side Scripting Accessing Web Servers – XAMPP Installation.	[9]
React JS* React JS – Introduction – Installation – Architecture – Components – Styling - Properties (props) - Event management - State Management - Http Client Programming - Form Programming.	[9]
Total Hours	45

Text Book(s):	
1.	Deitel H M, Deitel P, Deital A, “Internet and World Wide Web How to Program”, Pearson education, 5th edition, 2023.
2.	Alex banks & Eve Porcello, “Learning React”, O’Reilly Publications, 2017
Reference(s):	
1.	http:w3schools.com/js/
2.	Jeffrey C.Jackson, “Web Technologies-A computer science Perspective”, Pearson Education, 2016.
3.	https://www.w3schools.com/REACT/default.asp
4.	Gopalan N P, “ Web Technology: A Developer's Perspective”, 2nd edition PHI Learning, 2014.

*SDG 4 – Quality Education

**SDG 9 – Industry Innovation and Infrastructure

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Advanced Java Script**	
1.1	Introduction to JavaScript	1
1.2	JavaScript DOM Model	2
1.3	Exception Handling	1
1.4	Validation	1
1.5	Built-in objects	1
1.6	Event Handling	1
1.7	DHTML with JavaScript	2
2	**JQUERY**	
2.1	Introduction to jQuery	2
2.2	jQuery selectors	1
2.3	jQuery Events	2
2.4	jQuery Effects	2
2.5	jQuery HTML	1
2.6	jQuery AJAX	1
3	**TYPESCRIPT**	
3.1	Introduction – TS Types	1
3.2	Arrays	1
3.3	Tuples	1
3.4	Object Types	1
3.5	Union Types	1
3.6	Functions	1
3.7	Classes	1
3.8	Utility Types	1
3.9	TS Keyof	1
4	**MySQL and WebServer**	
4.1	Basic SQL	1
4.2	Setting Up a MySQL User Account	1
4.3	Creating Databases in MySQL	1
4.4	Web Server – Introduction	1
4.5	HTTP Transactions	1
4.6	Multitier Application Architecture	1
4.7	Client-Side Scripting versus Server-Side Scripting	1
4.8	Accessing Web Servers	1
4.9	XAMPP Installation	1
5	**React JS**	
5.1	React JS – Introduction – Installation	1
5.2	Architecture – Components	2
5.3	Styling - Properties (props)	1
5.4	Event management	1
5.5	State Management	1
5.6	Http Client Programming	1

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.7	Form Programming	2

Course Designer(s)

1. Ms.J.Mythili – mythili@ksrct.ac.in

61 CS 402	Database Management Systems	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

- To familiarize the students with various data models and query language
- Gain knowledge on data storage and indexing concepts
- To expose the fundamentals of transaction processing and recovery concepts
- To make the students aware of the various current trends in database system
- To know the current trends of various databases

Pre-requisites

Data Structures

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Express the knowledge of database systems and analyze the various data models	Analyze
CO2	Employ the concept of Data Definition Language and Data Manipulation Language and apply the various Normal Forms in database design	Apply
CO3	Express the knowledge of secondary storage device and the concepts of hashing, BTree, B+Tree in indexing to retrieve the data	Apply
CO4	Apply the various concurrency control techniques in database transactions and recovery techniques	Apply
CO5	Classify the recent databases such and Express the knowledge of data ware housing and data mining	Analyze

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	2	2	2	-	3	-	-	2		2	-
CO2	3	3	2	-	2	2	2	-	3	-	-	2	3	3	-
CO3	3	3	2	-	2	-	-	-	-	-	-	-	2	3	-
CO4	3	3	2	-	2	2	2	-	3	-	-	-	-	3	-
CO5	3	3	2	-	2	2	2	-		-	-	-	-	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	20	40	40
Analyse	10	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E. – Computer Science and Engineering

61 CS 402 – Database Management Systems

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Introduction and Conceptual Modeling* Introduction Database systems – DBMS Applications – Purpose of DBMS – Views of Data - Database System Architecture–Data Storage and Querying– DB Users and Administrators –Data Models–ER model–Relational Model – Relational Algebra and Calculus.	[9]
Relational Model* Introduction to SQL – Intermediate SQL – Advanced SQL – Triggers – Functions and Procedures – Embedded SQL - Normalization for Relational Databases (upto5NF) - Introduction to MongoDB.	[9]
Data Storage and Indexing Concepts* Record storage and Primary file organization – RAID – Operations on Files - Heap File Sorted Files - Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree.	[9]
Transaction Management * Transaction – Transaction Concepts- Transaction Model- Desirable properties of Transaction- Schedule and Recoverability- Serializability – Concurrency Control – Types of Locks- Two Phase locking -Time stamp based concurrency control – Recovery Techniques – Concepts - Immediate Update - Deferred Update.	[9]
Current Trends* Object Oriented Databases –Distributed databases- Homogenous and Heterogeneous-Distributed data Storage – Distributed Transaction–Commit Protocols - Data Mining–Data Mining Applications–Data Warehousing.	[9]
Total Hours	45
Text Book(s):	

1.	Abraham Silberschatz ,Henry F.Korth and S.Sudarshan, “Database System Concepts”, sixth Edition ,McGraw-Hill, 2011.
2.	Ramez Elmasri and Shamkant B.Navathe, “Fundamental Database Systems”, Fifth Edition, Pearson Education, 2009.
Reference(s):	
1.	Raghu Ramakrishnan,“Database Management System”, Tata McGraw-Hill Publishing Company, 2003.

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom, “Database System Implementation”, Pearson Education, 2003.
3.	Peter Rob and Corlos Coronel, “Database System,Design,Implementation and Management”, Thompson Learning Course Technology, Fifth edition, 2003.
4.	Rajiv Chopra,“Database Management System - a Practical Approach“, S.Chand & co

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Introduction and Conceptual Modeling**	
1.1	Introduction to database, Applications of DBMS.	1
1.2	Different Views of Data, Database System Architecture	1
1.3	Database Administrator	1
1.4	Entity Relationship Model	1
1.5	Relational Model	1
1.6	Tuple and Domain Relational Calculus	1
1.7	E-R Diagram Banking application	1
1.8	Hierarchical Model	1
1.9	Network Model	1
2	**Relational Model**	
2.1	Structure Query Language introduction - Data Definition Language	1
2.2	Data Manipulation Language – Select with where and order by	1
2.3	Select using aggregate function	1
2.4	Select using group by and having clause	1
2.5	Sub query and Views	1
2.6	Triggers	1
2.7	Function and Procedures	1
2.8	Normalization	1
2.9	Introduction to MongoDB	1

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3	**Data Storage and Indexing Concepts**	
3.1	Fixed and Variable length record structure	1
3.2	File Organization	1
3.3	RAID	2
3.4	Static and Dynamic Hashing	1
3.5	Indexing- Single, Multilevel and Mutable	1
3.6	Dense and Sparse Index	1
3.7	B and B+ Tree Index	1
3.8	Heap Organization	1
4	**Transaction Management**	
4.1	Transaction Concept and ACID properties	1
4.2	Transaction States and schedule	1
4.3	Conflict and View serializable schedule	1
4.4	Recoverability	1
4.5	Concurrency Control introduction- Share Lock, Exclusive Lock, Compatibility matrix, upgrade and downgrade	2
4.6	Two-Phase and Time stamp based locking protocol	1
4.7	Recovery Technique – Immediate Update	1

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.8	Recovery Technique – Deferred Update	1
5	**Current Trends**	
5.1	Object Oriented Database, Distributed Database Concept and Types	1
5.2	Distributed Transaction – Two-Phase Commit Protocol	1
5.3	Distributed Transaction – Three-Phase Commit Protocol	1
5.4	Distributed Data Storage	1
5.5	Data Mining Concept and Applications	1
5.6	Classification and Clustering Algorithms	2
5.7	Data Warehouse Concept and Preprocessing	1
5.8	Data Warehouse Schema Models	1
5.9	Designing three dimensional OLAP Cube with its operations	1

Course Designer(s)

1. Dr A Gnanabaskaran - gnanabaskarana@ksrct.ac.in

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60 CS 403	Software Engineering	Category	L	T	P	Credit
		PC	2	0	2	3

Objectives

- To understand the phases and process in a software Development
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies
- To learn various testing and maintenance measures
- To learn various project metrics and risk management

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Describe the key activities in managing a software process and project	Understand
CO2	Explain the concepts of requirements engineering and Modeling.	Understand
CO3	Apply systematic procedure for software design and deployment.	Apply
CO4	Compare and contrast the various testing and maintenance.	Analyze
CO5	Manage project schedule, estimate project cost and Identify Risk	Analyze

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	3	-	-	-	-	-	3	3	-	3	-	-
CO2	3	3	3	-	-	-	-	-	2	2	3	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	3	-	3	-	-
CO4	3	3	3	2	3	-	-	-	-	-	3	-	3	-	-
CO5	3	3	3	3	3	-	2	2	3	2	3	3	3	-	-

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	10	-
Understand	10	-	10	-	-	10	-
Apply	20	50	20	50	50	30	50
Analyse	20	50	20	50	50	50	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. – Computer Science and Engineering								
60 CS 403 – Software Engineering								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	2	0	2	60	3	50	50	100
Software Process and Agile Development* Introduction to Software Engineering, Software Development Lifecycle Software Process, Perspective and Specialized Process Models–Introduction to Agility-Agile process-Extreme programming-XP Process.								[6]
Requirements Analysis and Specification* Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document –Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri NetsData Dictionary.								[6]

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Software Design* Design process–Design Concepts-Design Model–Design Heuristic–Architectural DesignArchitectural styles, Architectural Design, Architectural Mapping using Data FlowUser Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.	[6]
Testing and Maintenance* Software testing fundamentals - Internal and external views of Testing-white box testingbasis path testing- control structure testing-black box testing - Regression Testing–Unit Testing –Integration Testing–Validation Testing–System Testing and Debugging–Software Implementation Techniques: Coding practices- Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.	[6]
Project Management* Software Project Management: Estimation–LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model–Project Scheduling–Scheduling, Earned Value Analysis Planning– Project Plan, Planning Process, RFP Risk Management–Identification, Projection-Risk Management-Risk Identification – RMMM Plan – CASE Tools.	[6]
Practical*: 1) Develop UML Use case model using Visual Paradigm for UML 8.2 2) Develop sequence diagram using Visual Paradigm for UML 8.2 3) Develop Class diagram using Visual Paradigm for UML 8.2 4) Preparation of SRS for project of Air Ticket Reservation System 5) Develop structural design for project of admission in College Management 6) Write programs in C- Language to demonstrate the working of the following constructs: i) do...while ii) while….do iii) if…else iv) switch v) for 7) A program written in C- language for Matrix Addition, Introspect the Causes for its failure and write down the possible reasons for its failure.	[30]
Total Hours: (Lecture - 30; Practical - 30)	60

Text Book(s):	
1.	Roger S. Pressman, Bruce R. Maxim, “Software Engineering – A Practitioner’s Approach”, 9th Edition, Mc Graw-Hill International Edition, 2019.
2.	Ian Sommerville, “Software Engineering”, 10th Edition, Pearson Education Asia, 2017.
Reference(s):	
1.	Pankaj Jalote, “Software Engineering, A Precise Approach”, Wiley India, 2010.
2.	Rajib Mall, “Fundamentals of Software Engineering”, Third Edition, PHI Learning Private Limited, 2009.
3.	Kelkar S.A., “Software Engineering”, Prentice Hall of India Pvt Ltd, 2007.
4.	Stephen R.Schach, “Software Engineering”, Tata McGraw-Hill Publishing Company Limited, 2007.

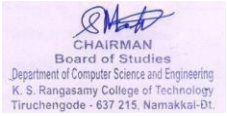
*SDG 4 – Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Software Process and Agile Development**	

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.1	Introduction to Software Engineering	1
1.2	Software Development Lifecycle	1
1.3	Software Process, Perspective	1
1.4	Specialized Process Models	1
1.6	Introduction to Agility-Agile process	1
1.6	Extreme programming - XP Process	1
2	**Requirements Analysis and Specification**	
2.1	Functional and Non-Functional, User requirements	1
2.2	System requirements, Software Requirements Document	1
2.3	Requirement Engineering Process: Feasibility Studies	1
2.4	Requirements elicitation and analysis	1
2.5	Requirements validation and management	1
2.6	Classical analysis: Structured system	1
3	**Software Design**	
3.1	Design process and Concepts.	1
3.2	Design Model and Design Heuristic	1
3.3	Architectural Design and Architectural styles	1
3.4	Architectural Mapping using Data Flow	1
3.5	User Interface Design - Interface analysis	1
3.6	Component level Design: Designing Class based components - traditional Components	1
4	**Testing and Maintenance**	
4.1	Software testing fundamentals-Internal and external views of Testing	1
4.2	White box testing-basis path testing, control structure testing	1
4.3	Black box testing-Regression Testing, Unit Testing , Integration Testing	1
4.4	Black box testing–Validation Testing, System Testing	1
4.5	Debugging, Software Implementation Techniques - Coding practices, Refactoring-Maintenance and Reengineering	1
4.6	BPR model, Reengineering process model - Reverse and Forward Engineering	1
5	**Project Management**	
5.1	Estimation–LOC, FP Based Estimation	1
5.2	Make/Buy Decision COCOMO I & II Model	1
5.3	Scheduling and Earned Value Analysis Planning	1
5.4	Project Plan and Planning Process	1
5.5	RFP Risk Management–Identification	1
5.6	Projection-Risk Management , Risk Identification - RMMM Plan - CASE Tools	1
Practical:		
1.	Develop UML Use case model using Visual Paradigm for UML 8.2	5



2.	Develop sequence diagram using Visual Paradigm for UML 8.2	4
3.	Develop Class diagram using Visual Paradigm for UML 8.2	4
4.	Preparation of SRS for project of Air Ticket Reservation System	4
5.	Develop structural design for project of admission in College Management	4
6.	Write programs in C- Language to demonstrate the working of the following constructs: i) do...while ii) while….do iii) if…else iv) switch v) for	5
7.	A program written in C- language for Matrix Addition, Introspect the Causes for its failure and write down the possible reasons for its failure	4

Course Designer(s)

1. Dr.B.G.Geetha – geetha@ksrct.ac.in

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

61 CS 4P1	Advanced Web Development Laboratory	Category	L	T	P	Credit
		CS	0	0	4	2

Objectives

- To learn the concepts of JavaScript to develop dynamic web pages
- To learn the concepts of jQuery
- To learn the concepts of TypeScript
- To learn the concepts of MySQL
- To learn the concepts of ReactJS

Pre-requisites

HTML, CSS

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply the basics concepts of JavaScript and express various types events	Apply
CO2	Develop programs using jQuery	Apply
CO3	Implement the concepts of TypeScript	Apply
CO4	Develop the dynamic website using MySQL	Apply
CO5	Apply the React JS framework to develop the dynamic web pages	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	3	2	2	3	-	3	-	-	-	3	2	3	-
CO2	2	3	3	2	2	3	-	3	-	-	-	2	2	2	-
CO3	2	2	3	2	2	3	-	3	-	-	-	2	2	2	-
CO4	2	2	3	3	2	2	-	3	-	-	-	2	2	2	-
CO5	2	3	3	3	3	3	-		-	-	-	1	2	3	-

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	12	50	-
Apply	50	13	50	100
Analyse				
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science Engineering								
61 CS 4P1 – Advanced Web Development Laboratory								
Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	0	0	4	60	2	60	40	100

List of Experiments: *

1. JavaScript program implement
   (a) string handling function
   (b) array handing function
2. Form validation using JavaScript program
3. Design a program for JQuery animation
4. Implementation the concept of JQuery AJAX
5. Implement the concepts of Typescript
6. Implement MySQL Database with XAMPP
7. Performing database Operations in XAMPP
8. Building Web Applications using MySQL
9. Develop application with React JS Constructors
   Deploying React JS for building dynamic web applications

*SDG 4 – Quality Education

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Designer(s)

1. Ms. J. Mythili – mythili@ksrct.ac.in

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61 CS 4P2	Database Management Systems Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To present SQL and procedural interfaces to SQL comprehensively
- To perform various commands in RDBMS
- To Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Triggers
- To design the applications using MongoDB
- To apply procedures and functions in PL/SQL

Pre-requisites

Data Structures

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Implement the Data Definition Language, Data Manipulation Language and Data Control Language commands in RDBMS	Apply

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO2	Employ the Sub queries, Views and Joins to retrieve data from multiple tables	Apply
CO3	Implement the High-level language extension with Cursors and Triggers	Apply
CO4	Implement the Procedures and Functions in PL/SQL	Apply
CO5	Demonstrate the working of MongoDB	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	3	2	2	-	3	3	-	2	2	2	-
CO2	3	3	3	-	3	2	2	-	3	3	-	2	2	2	-
CO3	3	3	3	-	3	2	2	-	3	3	-	2	2	2	-
CO4	3	3	3	-	3	2	2	-	3	3	-	2	2	2	-
CO5	3	3	3	-	3	2	2	-	3	3	-	2	2	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	12	-	-
Apply	50	13	100	100
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E - Computer Science Engineering								
61 CS 4P2 – Database Management Systems Laboratory								
Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	0	0	4	60	2	60	40	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

List of Experiments: *

1. Data Definition Language(DDL) commands in RDBMS.
2. Data Manipulation Language(DML), Data Control Language(DCL)and Transaction Control Language (TCL) commands in RDBMS.
3. Implementation of Sub queries.
4. Creation of views and joins.
5. High-level language extension with Cursors. 6. High level language extension with Triggers
7. Procedures and Functions.
8. Embedded SQL.
9. Installation of MongoDB CLI, create and access its collection in Studio 3T / Robo 3T.
10. Design and implementation of Payroll Processing System.
11. Design and implementation of Railway Reservation System

*SDG 9 – Industry Innovation and Infrastructure

Course Designer(s)

1. Dr. A. Gnanabaskaran – gnanabaskarana@ksrct.ac.in

60 CG 0P3	CAREER SKILL DEVELOPMENT - III	Category	L	T	P	Credit
		CG	0	0	2	1

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Objectives

- To help learners improve their logical reasoning skills at different academic and professional contexts.
- To help learners relate basic quantitative problems and solve them.
- To help learners Infer critically the statements with optimal conclusions and assumptions.
- To Solve the quantitative problems pertaining to calculations of averages, ratio and proportions, and profit and loss effectively
- To compute quantitative problems related to time and work, speed and distance, and simple and compound interest

Pre-requisites

Basic knowledge of Arithmetic and Logical Reasoning

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Deduce the topics in logical reasoning at the preliminary and intermediate level.	Analyze
CO2	Relate basic quantitative problems and solve them effectively at the preliminary level	Apply
CO3	Infer critically the statements with optimal conclusions and assumptions with the data and information given.	Analyze
CO4	Solve the quantitative problems pertaining to calculations of averages, ratio and proportions, and profit and loss effectively at the preintermediate level.	Apply
CO5	Compute quantitative problems related to time and work, speed and distance, and simple and compound interest at intermediate level.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	3	-	3	-	-	-	2	3	3	2	3	-
CO2	3	3	3	3	-	2	-	-	-	2	3	3	2	3	-
CO3	2	2	2	2	-	3	-	-	-	2	3	3	2	3	-
CO4	3	3	3	3	-	2	-	-	-	2	3	3		3	-
CO5	3	3	3	3	-	2	-	-	-	2	3	3		3	-
3 - Strong; 2 - Medium; 1 - Some															

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CG 0P3 - Career Skill Development - III								
Common to All Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	0	0	2	30	1	100	00	100

Logical Reasoning * Analogies - Alpha and numeric series - Number Series - Coding and Decoding - Blood Relations - Coded Relations - Order and Ranking – odd man out - Direction and distance	**[6]**
Quantitative Aptitude – Part 1* Number system - Squares & cubes - Divisibility - Unit digits - Remainder Theorem - HCF & LCM - Geometric and Arithmetic progression - Surds & indices	**[6]**
Critical Reasoning* Syllogism - Statements and Conclusions, Cause and Effect, Statements and Assumptions - identifying Strong Arguments and Weak Arguments – Cause and Action - Data sufficiency	**[6]**
Quantitative Aptitude – Part 2* Average - Ratio and proportion – Ages – Partnership– Percentage - Profit & loss – Discount - Mixture and Allegation	**[6]**
Quantitative Aptitude – Part 3* Time & Work - Pipes and cistern – Time, Speed & distance - Trains - Boats and Streams - Simple interest and Compound interest	**[6]**
Total Hours	**30**

Reference(s):

1.	Aggarwal, R.S. 'A Modern Approach to Verbal and Non-verbal Reasoning', Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2.	Abhijit Guha, 'Quantitative Aptitude', McGraw Hill Education, 6th edition, 2016
3.	Dinesh Khattar, 'Quantitative Aptitude For Competitive Examinations', Pearson Education 2020
4.	Anne Thomson, 'Critical Reasoning: A Practical Introduction' Lexicon Books, 3rd edition, 2022. Warszaw

*SDG 4 – Quality Education

*SDG 8 – Decent work and Economic growth *SDG 9 – Industry, innovation and Infrastructure

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Logical Reasoning**	
1.1	Analogies - Alpha and numeric series	1
1.2	Number Series - Coding and Decoding	1
1.3	Blood Relations - Coded Relations	2
1.4	Order and Ranking – odd man out	1
1.5	Direction and distance	1
2	**Quantitative Aptitude – Part 1**	
2.1	Number system	1
2.2	Squares & cubes - Divisibility	1
2.3	Unit digits - Remainder Theorem	1
2.4	HCF & LCM- Geometric and Arithmetic progression	2
2.5	Surds & indices	1
3	**Critical Reasoning**	
3.1	Syllogism	1
3.2	Statements and Conclusions, Cause and Effect	2
3.3	Statements and Assumptions	1
3.4	Identifying Strong Arguments and Weak Arguments	1
3.5	Cause and Action -Data sufficiency	1
4	**Quantitative Aptitude – Part 2**	
4.1	Average - Ratio and proportion	1
4.2	Ages – Partnership	1
4.3	Percentage	1
4.4	Profit & loss	1
4.5	Discount - Mixture and Allegation	2
5	**Quantitative Aptitude – Part 3**	
5.1	Time & Work	1
5.2	Pipes and cistern	1
5.3	Time, Speed & distance - Trains	1
5.4	Boats and Streams	1
5.5	Simple interest and Compound interest	2

Course Designer(s)

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Board of Studies
Department of Computer Science and Engineering
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Tiruchengode - 637 215, Namakkal-Dt.

1. R. Poovarasan- poovarasan@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215 (An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted in 2024-2025)

FIFTH SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment *	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 CS 501	Artificial Intelligence	2	40	60	100	45	100
2	60 CS 502	Computer Architecture	2	40	60	100	45	100
3	60 CS 503	Operating Systems	2	40	60	100	45	100
4	60 CS 504	Formal Language and Automata Theory	2	40	60	100	45	100
5	60 OE L0*	Open Elective-II	2	40	60	100	45	100
THEORY CUM PRACTICAL								
6	60 IT 003	Design Thinking	2	50	50	100	45	100
7	60 CS E1*	Professional Elective –I	2	50	50	100	45	100
PRACTICAL								
8	60 CS 5P1	Artificial Intelligence Laboratory	3	60	40	100	45	100
9	60 CS 5P2	Operating Systems Laboratory	3	60	40	100	45	100
10	60 CG 0P4	Career Skill Development – IV	1	100	-	100	-	100
11	60 CG 0P6	Internship	-	100	-	100	-	100

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination, 50 marks for theory cum practical End Semester Examination and 40 marks for practical End Semester Examination.

60 CS 501	Artificial Intelligence	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the fundamentals of problem solving
- To interpret the knowledge and reasoning in propositional logic and first order logic
- To gain knowledge on Planning and acting in the real world
- To represent uncertain knowledge in solving AI problems and ML and deep learning algorithms and models
- To understand the different forms of learning and NLP, computer vision

Pre-requisites

Linear Algebra

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the concepts of intelligent agents and problem solving aspects.	Understand
CO2	Interpret the knowledge of propositional logic and FOL.	Analyse
CO3	Understand the issues of planning problems.	Understand
CO4	Describe the Uncertainty and probabilistic reasoning and ML and deep learning algorithms and models.	Apply
CO5	Summarize the types of learning methods and AI applications, NLP, Computer vision.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	2	-	-	-	-	-	-	2	-	-	-
CO2	3	3	2	2	2	-	-	-	-	-	-	2	-	3	-
CO3	3	2	2	2	2	2	-	-	-	-	-	2	-	3	-
CO4	3	2	2	2	2	2	-	-	-	-	-	3	-	3	-
CO5	3	3	2	2	2	-	-	-	-	-	-	3	-	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	15	20	20
Apply	15	30	40
Analyse	20	-	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS 501 – Artificial Intelligence								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Problem Solving Introduction - What is Artificial Intelligence? – Structure of Intelligent Agents – Problem formulation – Uninformed search strategies – Informed search strategies – Constraint satisfaction problems.	[9]
Knowledge and Reasoning Logical agents – Propositional logic – First-order logic – Inference in first order logic – Unification - Forward Chaining – Backward Chaining – Resolution	[9]
Planning Planning Problem - Planning with state-space search – Partial-order planning – Planning graphs - Planning and acting in the real world - Conditional planning - Multi agent planning – Robotics – Action.	[9]
Uncertain Knowledge and Reasoning Uncertainty – Notations and Axioms of Probability – Probabilistic Reasoning – Bayesian networks (Semantics, Exact Inference, Approximate Inference) – Inference in Temporal models – Hidden Markov models - Knowledge representation and reasoning through fuzzy logic and Bayesian networks - **Introduction to ML - Machine learning fundamentals - Deep learning***	[9]
Learning and Applications Learning from observation – Inductive learning – Decision trees – Ensemble Learning – Explanation based learning – Statistical Learning methods. Applications of Artificial intelligence - Contemporary Issues: Recent Trends & Future of AI. Real-world applications: **NLP and Computer Vision***	[9]
Total Hours:	**45**

Text Book(s):	
1.	Russel S and Norvig P, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2022.
2.	Melanie Mitchell, "Artificial Intelligence: A Guide for Thinking Humans", Farrar, Straus and Giroux Publisher, 2019.
Reference(s):	
1.	Dan W. Patterson, "Introduction to AI and ES", Third Edition, Pearson Education, 2007.
2.	Nils J. Nilsson, "The Quest for Artificial Intelligence", Cambridge University Press, 2009.

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Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.	Nptel course, Artificial Intelligence, https://nptel.ac.in/courses/106106126/.
4.	Stuart Russell," Human Compatible – Artificial Intelligence and the Problem of Control", Viking publisher, 2019.

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Vehicle Structure and Electronic Engine Systems**	
1.1	Problem Solving	2
1.2	Introduction – What is Artificial Intelligence?	1
1.3	Structure of Intelligent Agents	2
1.4	Problem formulation	1
1.5	Uninformed search strategies	1
1.6	Informed search strategies	2
2.0	**Knowledge and Reasoning**	
2.1	Logical agents	2
2.2	Propositional logic	1
2.3	First-order logic	1
2.4	Inference in first order logic	1
2.5	Unification	1
2.6	Forward Chaining	1
2.7	Backward Chaining	1
2.8	Resolution	1
3.0	**Planning**	
3.1	Planning Problem	1
3.2	Planning with state-space search	1
3.3	Partial-order planning	1
3.4	Planning graphs	1
3.5	Planning and acting in the real world	1
3.6	Conditional planning	2
3.7	Multi agent planning	1
3.8	Robotics-Action	1
4.0	**Uncertain Knowledge and Reasoning**	
4.1	Uncertainty	1
4.2	Notations and Axioms of Probability	1

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.3	Probabilistic Reasoning	1
4.4	Bayesian networks (Semantics, Exact Inference, Approximate Inference)	1
4.5	Inference in Temporal models	1
4.6	Hidden Markov models	1
4.7	knowledge representation and reasoning through fuzzy logic and Bayesian networks	1
4.8	Introduction to AI and ML - Machine learning fundamentals	1
4.9	Deep learning	1
5.0	**Learning and Applications**	
5.1	Learning from observation	1
5.2	Inductive learning	1
5.3	Decision trees	1
5.4	Ensemble Learning	1
5.5	Explanation based learning	1
5.6	Statistical Learning methods	1
5.7	Applications of Artificial intelligence	1
5.8	Contemporary Issues: Recent Trends & Future of AI	1
5.9	NLP and Computer vision	1

Course Designer(s)

1. R. Vijaysai - vijaysair@ksrct.ac.in

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS 502	Computer Architecture	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To gain the knowledge about basic structure, Instructions, and functional units of a digital computer
- To study the operation of the arithmetic unit including the algorithms and implementation of data manipulation.
- To understand the different types of control and the concept of pipelining and study the hierarchical memory system, cache memory
- To realize the communication with I/O devices and standard I/O interfaces
- To recognize the instruction and thread level parallelism concepts and multicore processors

Pre-requisites

Digital Logic and Microprocessor

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic structure of computer, Instruction sequencing and Addressing modes.	Understand
CO2	Design adders, subtractors for fixed point numbers, multipliers and divisors of fixed numbers and floating-point numbers	Apply
CO3	Analyze instruction execution with control signals and pipelining operations	Analyse
CO4	Predict the cache memory and its performance, interrupts, buses, Direct Memory Access and Standard I/O Interfaces	Apply
CO5	Gain Knowledge about Parallelism concepts, compiler techniques, multiprocessor architecture and case studies on Intel's processors	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	-	-	-	-	-	-	2	-	2	-	2	-
CO2	3	3	2	-	2	-	-	-	-	2	-	2	-	2	-
CO3	3	3	2	-	2	-	2	-	-	2	-	2	-	2	-
CO4	2	2	2	-	-	-	-	-	-	2	-	2	-	2	-
CO5	3	2	2	-	-	-	2	-	-	2	-	2	-	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	10	30
Apply	30	20	30
Analyse	-	20	20

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS 502 – Computer Architecture								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Basic Structure of Computers* Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues.	[9]
Arithmetic Unit* Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations.	[9]
Basic Processing Unit* Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control - Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation.	[9]
Memory and I/O Systems* Speed, Size, Cost– Cache memories – Performance considerations – Accessing I/O Devices – Interrupts – Direct Memory Access – Buses– Interface Circuits– PCI, USB.	[9]
High Performance Computing* Instruction Level Parallelism: ILP concepts – Super pipelined and VLIW processor architectures- Array and vector processors - Dynamic Scheduling -Hardware Based Speculation – Static scheduling – Thread Level Parallelism: Symmetric and Distributed Shared Memory Architectures – Case studies: Intel core i7, Atom Processors.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Carl Hamacher, Zvonko Vranesic and SafwatZaky, “Computer Organization”, 6th Edition, McGraw-Hill, 2012.
2.	David A.Patterson and John L.Hennessy, “Computer Organization and Design: The hardware / software Interface”, 5th Edition, Morgan Kaufmann, 2014.
Reference(s):	
1.	William Stallings, “Computer Organization and Architecture – Designing for Performance”, 9th Edition, Pearson Education, 2012.
2.	John P.Hayes, “Computer Architecture and Organization”, 3rd Edition, McGraw Hill, 2012.
3.	http://www.ni.com/white-paper/11266/en/#toc1
4.	https://techreport.com/review/15818/intel-core-i7-processors https://www.intel.in/content/www/in/en/products/processors/atom.html

*SDG 9 – Industry Innovation and Infrastructure

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Vehicle Structure and Electronic Engine Systems**	
1.1	Functional units	1
1.2	Basic operational concepts, Bus Structures	2
1.3	Software performance	1
1.4	Memory locations, addresses and Memory operations	1
1.5	Instruction sequencing	1
1.6	Addressing modes	2
1.7	Assembly language	1
1.8	Basic I/O operations – Stacks and queues	1
2.0	**Arithmetic Unit**	
2.1	Addition and subtraction of signed numbers	2
2.2	Design of fast adders	2
2.3	Multiplication of positive numbers	1
2.4	Signed operand multiplication and fast multiplication	2
2.5	Integer division	1
2.6	Floating point numbers and operations	1
3.0	**Basic Processing Unit**	
3.1	Fundamental concepts	1
3.2	Execution of a complete Instruction	1
3.3	Multiple bus organization	1
3.4	Hardwired control and Micro programmed control	2
3.5	Basic concepts of Pipelining	1
3.6	Data hazards and Instruction hazards	1
3.7	Influence on Instruction sets	1
3.8	Data path and control consideration	1
3.9	Superscalar operation	
4.0	**Memory and I/O Systems**	
4.1	Speed, Size, Cost	1
4.2	Cache memories	1
4.3	Performance considerations	1
4.4	Accessing I/O Devices	1
4.5	Interrupts	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.6	Direct Memory Access	1
4.7	Buses	1
4.8	Interface Circuits	1
4.9	PCI, USB	1
5.0	**High Performance Computing**	
5.1	Instruction Level Parallelism: ILP concepts	1
5.2	Super pipelined and VLIW processor architectures	1
5.3	Array and vector processors	1
5.4	Dynamic Scheduling	1
5.5	Hardware Based Speculation	1
5.6	Static scheduling	1
5.7	Thread Level Parallelism	1
5.8	Symmetric and Distributed Shared Memory Architectures	1
5.9	Case studies: Intel core i7, Atom Processors	1

Course Designer(s)

1. Dr. R. Chithra – chithra@ksrct.ac.in

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS 503	Operating Systems	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To describe the services provided by and the design of an operating system.
- To understand the structure and organization of the file system, processes synchronization, process scheduling, system calls and different approaches to memory management
- To efficiently allocate and deallocate memory to optimize system performance
- To ensure the integrity, confidentiality, and availability of the information, processes, and resources managed by the OS
- To provide a consistent interface for processes, memory, files, devices, and network communication

Pre-requisites

- Computer Architecture

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Describe the components and basic organization of computer systems	Understand
CO2	Analyse process scheduling, synchronization and deadlocks	Analyse
CO3	Develop memory-management techniques and describe virtual memory system	Apply
CO4	Explain file system design, directory structures and apply algorithms for disk scheduling	Apply
CO5	Analyse the OS security features and recognize the OS abstractions to effectively manage processes, memory, files, and devices	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	-	2	-	-	2	-	2	3	2	-
CO3	3	3	3	3	-	-	2	-	-	2	-	2	3	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	2	3	-	-
CO5	3	3	3	3	-	-	2	-	-	-	-	2	3	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	20
Apply	20	30	40
Analyse	10	-	20
Evaluate	-	-	-

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
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CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS 503 – Operating Systems

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Operating Systems Overview* Introduction to operating systems – Computer system organization, architecture – Operating system structure, operations – Process, memory, storage management – Protection and security – Distributed systems – Computing Environments – Opensource operating systems – OS services – User operating-system interface – System calls – Types – System programs – OS structure – OS generation – System Boot – Process concept, scheduling – Operations on processes – Cooperating processes – Inter-process communication – Examples – Multithreading models – Thread Libraries – Threading issues – Mobile operating systems: Symbian OS, Android OS, iphone(iOS), iPhone OS (iOS).	[9]
Process Management* Basic concepts – Scheduling criteria – Scheduling algorithms – Thread scheduling – The critical-section problem – Peterson‘s solution – Synchronization hardware – Semaphores – Classic problems of synchronization – Critical regions – Monitors – Synchronization examples – Deadlocks: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock detection – Recovery from deadlock.	[9]
Storage Management* Memory Management – Swapping – Contiguous memory allocation – Paging – Segmentation – Example: The Intel Pentium - Virtual Memory: Background – Demand paging – Copy on write – Page replacement – Allocation of frames – Thrashing.	[9]
I/OSystems* File concept – Access methods – Directory structure – File-system mounting – Protection – Directory implementation – Allocation methods – Free-space management – Disk scheduling – Disk management – Swap-space management.	[9]
OS Security and Case Study* Types of Threats in OS - Basic OS Security Mechanisms - Understanding the Threats - Malware Taxonomy – Viruses – Worms – Rootkits - Linux/Unix OS design and architecture - Unix shell - Unix operating system services - Processes: fork – wait – exec – exit – kill – getpid – brk – nice – sleep – trace - Files: open – close – read – write – lseek – stat – sync - Directories: mkdir – rmdir – link – unlink – mount - umount users + - Security: chown – chmod – getuid – setuid - Inter process communication: signals – pipe - Networking: socket – accept – snd – recv - connect	[9]
Total Hours:	**45**

Text Book(s):

1.	Silberschatz, Galvin, Gagne, “Operating System Concepts”, 8th Edition, John Willey & Sons, Inc., 2009.
2.	Dhamdhare, “Operating Systems-A Concept Based Approach” - TMH 2006.

Reference(s):

1.	EktaWalia, “Operating System Concepts”, Khanna Book Publishing, 2020.

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	William Stallings, “Operating systems Internals and design principles” ,Pearson Education, 2012.
3.	Crowley, “Operating Systems –A Design Oriented Approach”, TMH, 2001.
4.	Andrew S. Tanenbaum, “Operating systems Design and Implementation”, Pearson Education, 2009.

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Operating Systems Overview**	
1.1	Introduction to operating systems – Computer system organization, architecture	1
1.2	Operating system structure, operations – Process, memory, storage management	1
1.3	Protection and security – Distributed systems – Computing Environments	1
1.4	Open-source operating systems – OS services – User operating-system interface	1
1.5	System calls – Types – System programs – OS structure – OS generation – System Boot	1
1.6	Process concept, scheduling – Operations on processes – Cooperating processes	1
1.7	Inter-process communication – Examples	1
1.8	Multithreading models – Thread Libraries – Threading issues	1
1.9	Mobile operating systems: Symbian OS, Android OS, iphone(iOS), iPhone OS (iOS)	1
2	**Process Management**	
2.1	Basic concepts – Scheduling criteria – Scheduling algorithms – Thread scheduling	1
2.2	The critical-section problem – Peterson‘s solution	1
2.3	Synchronization hardware – Semaphores – Classic problems of synchronization	1
2.4	Critical regions	1
2.5	Monitors - Synchronization examples	1
2.6	Deadlocks: System model – Deadlock characterization – Methods for handling deadlocks	1
2.7	Deadlock Prevention	1
2.8	Deadlock Avoidance	1
2.9	Deadlock detection – Recovery from deadlock	1
3	**Storage Management**	
3.1	Memory Management	1
3.2	Swapping	1
3.3	Contiguous memory allocation	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.4	Paging	1
3.5	Segmentation - Example: The Intel Pentium	1
3.6	Virtual Memory: Background – Demand paging	1
3.7	Copy on write	1
3.8	Page replacement	1
3.9	Allocation of frames – Thrashing	
4	**I/OSystems**	
4.1	File concept – Access methods	1
4.2	Directory structure	1
4.3	File-system mounting - Protection	1
4.4	Directory implementation	1
4.5	Allocation methods	1
4.6	Free-space management	1
4.7	Disk scheduling	1
4.8	Disk management	1
4.9	Swap-space management	1
5	**OS Security and Case Study**	
5.1	Types of Threats in OS - Basic OS Security Mechanisms	1
5.2	Understanding the Threats	1
5.3	Malware Taxonomy – Viruses – Worms – Rootkits	1
5.4	Linux/Unix OS design and architecture - Unix shell - Unix operating system services	1
5.5	Processes: fork – wait – exec – exit – kill – getpid – brk – nice – sleep – trace	1
5.6	Files: open – close – read – write – lseek – stat – sync -	1
5.7	Directories: mkdir – rmdir – link – unlink – mount - umount users +	1
5.8	Security: chown – chmod – getuid – setuid	1
5.9	Inter process communication: signals – pipe - Networking: socket – accept – snd – recv - connect	1

Course Designer(s)

1. Mrs.R.KABILA - kabila@ksrct.ac.in

60 CS 504	Formal Language and Automata Theory	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

- To understand the types of finite automata and the relationship between finite automata
- To understand regular expressions, push down automata and context free grammar
- To understand the properties of context free language
- To learn the programming techniques of Turing machine and undecidable problems
- To learn the concepts of Undecidability and interactable Problems

Pre-requisites

Discrete Mathematics

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic properties of formal language and finite automata.	Understand
CO2	Analyse regular expressions and the properties of regular languages.	Analyse
CO3	Construct grammars to produce strings from a specific language.	Apply
CO4	Analyse the construction of Push Down Automata.	Analyse
CO5	Interpret the uses of Turing machine, undecidability, and interactable problems.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	2	-	-	-	-	-	-	1	-	3	3	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-	3	3	-
CO3	3	3	2	-	-	-	-	2	-	-	2	2	3	3	-
CO4	3	3	3	2	-	-	-	2	-	1	2	-	3	3	-
CO5	3	3	2	-	-	-	-	2	-	1	2	-	3	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	20	30	40
Analyse	20	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS 504 - Formal Language and Automata Theory								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	1	0	60	4	40	60	100

INTRODUCTION Alphabets, Strings and Languages, Automata and Grammars - Deterministic finite Automata (DFA)-Formal Definition, Simplified notation, State transition graph, Transition table, Language of DFA - Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA - Minimization of Finite Automata - Myhill-Nerode Theorem, FA with output - Moore and Mealy machine, Equivalence of Moore and Mealy Machine - **Applications and Limitation of FA***.	[9]
REGULAR EXPRESSION Definition, Operators of regular expression and their precedence - Algebraic laws for Regular expressions, Kleen's Theorem - Regular expression to FA, DFA to Regular expression - Arden Theorem, Non Regular Languages - Pumping Lemma for regular Languages - Application of Pumping Lemma - Closure properties of Regular Languages - Decision properties of Regular Languages.	[9]
GRAMMAR FORMALISM Regular grammars - Right linear and left linear grammars - Equivalence between regular linear grammar and FA - Context Free Grammar, Definition, Examples, Derivation - Derivation trees, Ambiguity in Grammar - Inherent ambiguity, Ambiguous to Unambiguous CFG - Simplification of CFGs - Normal forms for CFGs - CNF and GNF - Closure properties of CFLs; Decision Properties of CFLs- Emptiness, Finiteness and Membership - Pumping lemma for CFLs.	[9]
PUSH DOWN AUTOMATA (PDA) Description and definition, Instantaneous Description - Language of PDA, Acceptance by Final state, Acceptance by empty stack - Deterministic PDA, Equivalence of PDA and CFG - CFG to PDA and PDA to CFG - Two stack PDA.	[9]
TURING MACHINES Basic model, Definition and representation, Instantaneous Description - Language acceptance by TM - Computable functions, Types of Turing machines - Recursive and recursively enumerable languages - Halting problem.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Hopcroft J E, Motwani R and Ullman J D, "Introduction to Automata Theory, Languages and Computations", Third Edition, Pearson Education, 2008.
2.	Anil Maheshwari, Michiel Smid, "Introduction to Theory of Computation", School of Computer Science Carleton University, 2019.
Reference(s):	
1.	Sipser Michael, "Introduction to the Theory of Computation", Third Edition, Thomson Press (India) Ltd.
2.	Martin J, "Introduction to Languages and the Theory of Computation", Third Edition, McGraw Hill Education, 2007.
3.	Lewis H R and Papadimitriou C H, "Elements of The theory of Computation", Second Edition, Pears Education/PHI, 2003.
4.	Karibasappa, Basavaraj K G, Anami S, "Formal Languages and Automata Theory", First Edition, Wiley publisher, 2011.

*SDG 9 – Industry Innovation and Infrastructure

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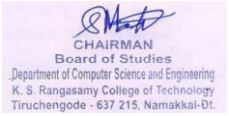
Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**INTRODUCTION**	
1.1	Alphabets, Strings and Languages, Automata and Grammars	1
1.2	Deterministic finite Automata (DFA)-Formal Definition, Simplified notation, State transition graph,Transition table, Language of DFA	1
1.3	Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA	2
1.4	Equivalence of NFA and DFA	1
1.5	Minimization of Finite Automata	1
1.6	Myhill-Nerode Theorem, FA with output	1
1.7	Moore and Mealy machine, Equivalence of Moore and Mealy Machine	1
1.8	Applications and Limitation of FA.	1
2.0	**REGULAR EXPRESSION**	
2.1	Definition, Operators of regular expression and their precedence	1
2.2	Algebraic laws for Regular expressions, Kleen's Theorem	2
2.3	Regular expression to FA, DFA to Regular expression	1
2.4	Vehicle Pollutants and its Effect	1
2.5	Arden Theorem, Non Regular Languages	1
2.6	Pumping Lemma for regular Languages	1
2.7	Application of Pumping Lemma	1
2.8	Closure properties of Regular Languages	1
2.9	Decision properties of Regular Languages.	1
3.0	**GRAMMAR FORMALISM**	
3.1	Regular grammars-Right linear and left linear grammars	1
3.2	Equivalence between regular linear grammar and FA	1
3.3	Context Free Grammar, Definition, Examples, Derivation	1
3.4	Derivation trees, Ambiguity in Grammar,	1
3.5	Inherent ambiguity, Ambiguous to Unambiguous CFG	1
3.6	Simplification of CFGs	1
3.7	Normal forms for CFGs - CNF and GNF	1
3.8	Closure properties of CFLs; Decision Properties of CFLs- Emptiness, Finiteness and Membership,	1
3.9	Pumping lemma for CFLs.	1
4.0	**PUSH DOWN AUTOMATA (PDA)**	
4.1	Description and definition, Instantaneous Description	1
4.2	Language of PDA, Acceptance by Final state, Acceptance by empty stack	2
4.3	Deterministic PDA,	2
4.4	Equivalence of PDA and CFG - CFG to PDA and PDA to CFG	2
4.5	Two stack PDA.	2



5.0	**TURING MACHINES**	
5.1	Basic model, Definition and representation, Instantaneous Description	1
5.2	Language acceptance by TM	1
5.3	Computable functions, Types of Turing machines	2
5.4	Recursive and recursively enumerable languages	1
5.5	Halting problem	1
5.6	Introduction to Undecidability, Undecidable problems about TMs,	1
5.7	Post correspondence problem (PCP), Modified PCP.	2

Course Designer(s)

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60 IT 003	Design Thinking	Category	L	T	P	Credit
		PC	2	0	2	3

Objectives

- To learn design thinking concepts and principles.
- To design thinking methods in every stage of the problem.
- To learn the different phases of design thinking.
- To learn the application of design thinking for the IT industry • To apply various methods in design thinking to different problems.

Pre-requisites

- Basic knowledge of mathematics and programming.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply design thinking for product development	Understand
CO2	Use design thinking tools	Understand
CO3	Identify need for products and disruption	Apply
CO4	Design innovative products	Analyze
CO5	Apply design thinking to improve on existing products in IT	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	3	3	3	3	3	-	-	3	2	-
CO2	3	2	3	2	3	3	3	2	3	3	-	-	2	3	-
CO3	3	3	3	2	3	3	2	3	-	-	-	-	3	3	-
CO4	3	3	3	3	3	3	3	-	3	-	-	-	2	2	-
CO5	3	3	3	3	3	-	3	-	-	-	-	-	3	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	-	-	-	-	-	-	-
Understand	40	-	40	-	-	60	-
Apply	20	50	20	50	50	40	50
Analyse	-	50	-	50	50	-	50
Evaluate	-	-	-	-	-	-	-

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Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Computer Science and Business Systems								
60 IT 003 – Design Thinking								
Common to IT,CSE,AIML,AI&DS,CSBS								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	2	0	2	60	3	50	50	100

Introduction to Design Thinking * Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project.	**[6]**
Understand, Observe and Define the Problem Search field determination - Problem clarification - Understanding of the problem – Problem analysis - Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Description of customer needs.	**[6]**
Ideation and Prototyping ** Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase – Learn Startup Method for Prototype Development - Visualization and presentation techniques.	**[6]**
Testing and Implementation *** Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking.	**[6]**
Future Design Thinking meets the corporation – The New Social Contract – Design Activism – Designing tomorrow.	**[6]**

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Practical: 1. 2030 Schools Challenge: Concept: Design thinking is often presented without teaching content. This is very different. Learners get 30 minutes to choose a UN 2030 Goal (there are 17) that is relevant and meaningful to them, then they get into small groups. The group researches the goal quickly, by answering the questions: What does the world need to know about this goal and what can we do about it? The group then creates a short PSA (Public Service Announcement) and shares it widely with an authentic audience. It is fun, fast, and shows the power of design sprints to teach content and skills. 2. THE GIFT-GIVING PROJECT VIA STANFORD D-SCHOOL Concept: The Gift-Giving Project is 90-minute (plus debrief) fast-paced project through a full design cycle. Students pair up to interview each other, come to a point-of-view of how they might design for their partner, ideate, and prototype a new solution to "redesign the gift giving experience" for their partner. 3. THE WALLET PROJECT VIA STANFORD D-SCHOOL Concept: Very similar to the Gift-Giving Project, the Wallet Project is 90-minute (plus Tentative 48 debrief) fast-paced project through a full design cycle. Students pair up, show and tell each other about their wallets, ideate, and make a new solution that is "useful and meaningful" to their partner. 4. INVENT A SPORT (WITH JUST THESE ITEMS) Concept: We've all played sports at some point in our life. Who came up with the rules? Who created the game? Who made the constraints? And who decided the objects to play with? Now, with limited time and resources, your group will create and invent a new sport, and a set of directions for people to actually play the game. 5. "BOOK IN AN HOUR" ACTIVITY (VIA ALL WHO WONDER) Concept: Give a group a book (fiction or non-fiction). Then you break them up into smaller groups (or individuals) to read different parts of the book. Each group (or person) has to read and then create an overview/trailer of their part of the book to share chronologically with the rest of the class. Here the design really starts with the creative process driving how you share the information, plot, characters etc. Perfect use for professional development when you want to introduce a topic in a fun, engaging way. 6. CHILDREN'S STORY DESIGN ACTIVITIES Concept: The University of Arkansas created a series of STEM Challenges that work as great design activities with groups old and young! For example after reading "The Three Billy Goat's Gruff" they set up a challenge like this: You decide to help the billy goats reach the opposite side of the creek so they can eat. You must create a model structure to help the billy goats get from one side to the other while using the design loop and only the materials provided. Your teacher will also provide you with model billy goats, with specific weights, that your bridge must be able to withstand. 7. New Product Development Activity: Student teams were given products ranging from toys to air fresheners. In 2 days, they had to create pitches on how to improve these products. The idea was to give them a clear sense of the scope of what they would do in a product development.	**[30]**
Total Hours:(Theory – 30 + Practical – 30)	60

Text Book(s):	
1.	Christian Mueller-Roterberg, Handbook of Design Thinking - Tips & Tools for how to design thinking. [Unit 1, 2, 3, 4]
2.	Designing for Growth: a design thinking tool kit for managers By Jeanne Liedtka and Tim Ogilvie. [Unit 1]
3.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation by Tim Brown. [Unit 5]
Reference(s):	
1.	Johnny Schneider, "Understanding Design Thinking, Lean and Agile", O'Reilly Media, 2017.

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2.	Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3.	Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011.
4.	Alistair Cockburn, “Agile Software Development”, 2nd ed, Pearson Education, 2007.
5.	http://ajjuliani.com/design-thinking-activities
6.	https://venturewell.org/class-exercises

* SDG-4 – Quality Education

* * SDG-8 – Employment and decent work for all * * * SDG-9 – Industrialization and foster innovation

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Design Thinking**	
1.1	Why Design? - Four Questions	1
1.2	Ten Tools	1
1.3	Principles of Design Thinking	2
1.4	The process of Design Thinking	1
1.5	How to plan a Design Thinking project.	1
2.0	**Understand, Observe and Define The Problem**	
2.1	Search field determination	1
2.2	Problem clarification - Understanding of the problem	1

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2.3	Problem analysis - Reformulation of the problem	1
2.4	Observation Phase - Empathetic design	1
2.5	Tips for observing, Methods for Empathetic Design	1
2.6	Description of customer needs	1
3.0	**Ideation and Prototyping**	

3.1	Ideate Phase	1
3.2	The creative process and creative principles	1
3.3	Creativity techniques	1
3.4	Evaluation of ideas, Prototype Phase	1
3.5	Learn Startup Method for Prototype Development	1
3.6	Visualization and presentation techniques.	1
4.0	**Testing and Implementation**	
4.1	Test Phase - Tips for interviews	1
4.2	Tips for surveys - Kano Model	1
4.3	Desirability Testing - How to conduct workshops	1
4.4	Requirements for the space	1
4.5	Material requirements	1
4.6	Agility for Design Thinking	1
5.0	**Future**	
5.1	Design Thinking meets the corporation	2
5.2	The New Social Contract	2
5.3	Design Activism	1
5.4	Designing tomorrow	1
Practical:		
1	2030 Schools Challenge: Concept: Design thinking is often presented without teaching content. This is very different. Learners get 30 minutes to choose a UN 2030 Goal (there are 17) that is relevant and meaningful to them, then they get into small groups. The group researches the goal quickly, by answering the questions: What does the world need to know about this goal and what can we do about it? The group then creates a short PSA (Public Service Announcement) and shares it widely with an authentic audience. It is fun, fast, and shows the power of design sprints to teach content and skills.	4
2	THE GIFT-GIVING PROJECT VIA STANFORD D-SCHOOL Concept: The Gift-Giving Project is 90-minute (plus debrief) fast-paced project through a full design cycle. Students pair up to interview each other, come to a point-ofview of how they might design for their partner, ideate, and prototype a new solution to “redesign the gift giving experience” for their partner.	4
3	THE WALLET PROJECT VIA STANFORD D-SCHOOL Concept: Very similar to the Gift- Giving Project, the Wallet Project is 90-minute (plus Tentative 48 debrief) fast-paced project through a full design cycle. Students pair up, show	4
	and tell each other about their wallets, ideate, and make a new solution that is “useful and meaningful” to their partner.	

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4	INVENT A SPORT (WITH JUST THESE ITEMS) Concept: We've all played sports at some point in our life. Who came up with the rules? Who created the game? Who made the constraints? And who decided the objects to play with? Now, with limited time and resources, your group will create and invent a new sport, and a set of directions for people to actually play the game.	4
5	"BOOK IN AN HOUR" ACTIVITY (VIA ALL WHO WONDER) Concept: Give a group a book (fiction or non-fiction). Then you break them up into smaller groups (or individuals) to read different parts of the book. Each group (or person) has to read and then create an overview/trailer of their part of the book to share chronologically with the rest of the class. Here the design really starts with the creative process driving how you share the information, plot, characters etc. Perfect use for professional development when you want to introduce a topic in a fun, engaging way.	4
6	CHILDREN'S STORY DESIGN ACTIVITIES Concept: The University of Arkansas created a series of STEM Challenges that work as great design activities with groups old and young! For example after reading "The Three Billy Goat's Gruff" they set up a challenge like this: You decide to help the billy goats reach the opposite side of the creek so they can eat. You must create a model structure to help the billy goats get from one side to the other while using the design loop and only the materials provided. Your teacher will also provide you with model billy goats, with specific weights, that your bridge must be able to withstand.	5
7	New Product Development Activity: Student teams were given products ranging from toys to air fresheners. In 2 days, they had to create pitches on how to improve these products. The idea was to give them a clear sense of the scope of what they would do in a product development.	5
	Total	60

Course Designer(s)

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60 CS 5P1	Artificial Intelligence Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- Recognize the fundamentals of problem solving.
- Apply the knowledge and reasoning in propositional logic and first order logic.
- Gain knowledge on Planning and acting in the real world.
- Learn and apply to represent uncertain knowledge in solving AI problems and ML and deep learning algorithms and models.
- Apply the different forms of learning and NLP, computer vision

Pre-requisites

Linear Algebra, Basics of programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the various algorithms to increase the AI performance and apply the algorithms to solve the real time problems	Apply
CO2	Apply various AI models to solve real time problems	Apply
CO3	Analyse Artificial Intelligence concepts to solve real world problems	Analyse
CO4	Apply various regression models to solve AI problems	Apply
CO5	Construct various machine learning models for text classification	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	2	-	-	-	-	-	-	2	-	-	-
CO2	3	3	2	2	2	-	-	-	-	-	-	2	-	3	-
CO3	3	2	2	2	2	2	-	-	-	-	-	2	-	3	-
CO4	3	2	2	2	2	2	-	-	-	-	-	3	-	3	-
CO5	3	3	2	2	2	-	-	-	-	-	-	3	-	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	50	15	80	80
Analyse	-	10	20	20
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS 5P1 – Artificial Intelligence Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	0	0	4	60	2	60	40	100

List of Experiments*:

1. Develop PEAS descriptions for given AI tasks
2. Write a program to generate the output for A* algorithm
3. Approximate inferences in Bayesian network
4. Implementation of Hidden Markov Models
5. Implement propositional logic inferences for AI tasks
6. Implementation of Python libraries for ML application such as Pandas and Matplotlib.
7. Write a Python program to implement simple linear regression and plot the graph.
8. Implementation of logistic regression for iris using sklearn.
9. Implementation of naïve bayes classifier algorithm.
10. Implementation of SVM classification.
11. Performance analysis of a specific dataset.(Mini project).

*SDG 9 – Industry Innovation and Infrastructure

Course Designer(s)

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60 CS 5P2	Operating Systems Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To identify and solve the issues related to Operating System Components
- To learn different programming language in Linux editor environment
- To implement different operating system algorithm
- To implement the performance of different algorithms like CPU scheduling
- To implement the performance of different algorithms like page replacement, deadlock avoidance and detection

Pre-requisites

Computer Architecture

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Learn the basics of Operating system installation and shell scripts and analyze the System calls for Process and inter process communications	Apply
CO2	Examine the steps in process operation and examine the criteria involved in CPU scheduling algorithms.	Apply
CO3	Analyzing the different deadlock avoidance mechanism and implement Classic problem of Synchronization using semaphores	Analyse
CO4	Implement Storage Management and page replacement algorithms	Apply
CO5	Implement the file concept and its allocations and understand the factors in disk scheduling algorithms	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	-	-	-	-	2	-	-	3	-	-	-
CO2	3	3	3	3	-	-	2	-	2	2	-	2	-	3	-
CO3	3	3	3	3	-	-	2	-	2	2	-	2	-	3	-
CO4	3	2	3	-	-	-	-	-		-	-	2	-	3	-
CO5	3	3	3	3	-	-	2	-		-	-	2	-	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)	
	Lab	Activity			
Remember	-	-	-	-	-
Understand	-	-	-	-	-
Apply	50	15	80	-	80
Analyse	-	10	20	-	20
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS 5P2 – Operating Systems Laboratory								
Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	0	0	4	60	2	60	40	100

List of Experiments:

1. Installation of Operating system and implementation of Basic Shell Programming Concepts like Loops, Functions, Patterns, Substitutions*.
2. Familiarization with System calls for Process and inter process communications*.
3. Implement the operation on process*.
4. Implement and analyze the scheduling criteria's of CPU Scheduling Algorithms*.
5. Implement Deadlock avoidance mechanism from deadlock in a real time environment using C*.
6. Implement Classic problem of Synchronization using semaphores*.
7. Implement Contiguous Memory Allocation*.
8. Implement Page replacement algorithm*.
9. Implement various file allocation Methods*.
10. Implement Disk Scheduling to find the seek time of accessing the required information using different Scheduling algorithm*.

*SDG 9 – Industry Innovation and Infrastructure

Course Designer(s)

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60 CG 0P4	Career Skill Development - IV	Category	L	T	P	Credit
		CG	0	0	2	1*

Objective

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations
- Improve listening, observational skills, and problem-solving capabilities
- Develop message generating and delivery skills

Prerequisite

Basic knowledge of Arithmetic and Logical Reasoning

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compare and contrast products and ideas in technical texts.	Analyze
CO2	Identify cause and effects in events, industrial processes through technical texts	Analyze
CO3	Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Analyze
CO4	Report events and the processes of technical and industrial nature.	Apply
CO5	Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	3		3				2	3	3	2	3
CO2	3	3	3	3		2				2	3	3	2	3
CO3	2	2	2	2		3				2	3	3	2	3
CO4	3	3	3	3		2				2	3	3		3
CO5	3	3	3	3		2				2	3	3		3

3- Strong; 2-Medium; 1-Some

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Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	0	0	2	30	1	100	00	100

Verbal & Analytical Reasoning* Seating Arrangements – Analytical Reasoning (PUZZELS) – Machin input and output - Coded Inequality – Eligibility Test	**[6]**
Quantitative Aptitude - Part – 4* Permutation and Combination - Probability - Quadratic equation - Geometry – Clock – Calendar – Logarithmic	**[6]**
Non-Verbal Reasoning * Series Completion of Figures – Classification – Courting of figure – Figure matrix – Embedded Figure – Complete Figure – Paper Cutting and Folding – Mirror images and Water Images	**[6]**
Quantitative Aptitude - Part – 5* Mensuration of Area, Volume and Surface area in 2D and 3D Shapes – 2D Shapes – Square, Rectangle, Triangle, Circle, etc. - 3D Shapes – Cube, Cuboid , Sphere , Cone , etc.	**[6]**
Data Interpretation and Analysis* Data interpretation Based on text - Data interpretation Based on Tabulation , Pie chart , Bar graph , And Line graph – Venn Diagram - Data sufficiency	**[6]**
Total Hours	**30**

Reference(s):

1.	Aggarwal R.S., “A Modern Approach to Verbal and Non-verbal Reasoning”, S.Chand & Co Ltd., Revised Edition 2008, Reprint 2009, New Delhi.
2.	Abhijit Guha, “Quantitative Aptitude”, McGraw Hill Education, 6th edition, 2016.
3.	Dinesh Khattar, “Quantitative Aptitude For Competitive Examinations”, Pearson Education, 2020.
4.	Anne Thomson, “Critical Reasoning: A Practical Introduction”, Lexicon Books, 3rd edition, 2022. Warszaw

* SDG 4 – Quality Education
* SDG 8 – Decent work and Economic growth
* SDG 9 – Industry, innovation and Infrastructure Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Verbal & Analytical Reasoning**	
1.1	Seating Arrangements	1
1.2	Analytical Reasoning (PUZZELS)	1
1.3	Machin input and output	1
1.4	Coded Inequality	1
1.5	Eligibility Test	2
2	**Quantitative Aptitude - Part – 4**	
2.1	Permutation and Combination	1
2.2	Probability	1
2.3	Quadratic equation - Geometry	1

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.4	Clock – Calendar	1
2.5	Logarithmic	2
3	**Non-Verbal Reasoning**	
3.1	Series Completion of Figures – Classification	1
3.2	Courting of figure – Figure matrix	1
3.3	Embedded Figure – Complete Figure	1
3.4	Paper Cutting and Folding	1
3.5	Mirror images and Water Images	2
4	**Quantitative Aptitude - Part – 5**	
4.1	Mensuration of Area, Volume	1
4.2	Mensuration of Volume	1
4.3	Surface area in 2D and 3D Shapes	1
4.4	2D Shapes – Square, Rectangle, Triangle, Circle, etc.	1
4.5	3D Shapes – Cube, Cuboid , Sphere , Cone , etc.	2
5	**Data Interpretation and Analysis**	
5.1	Data interpretation Based on text	1
5.2	Data interpretation Based on Tabulation, Pie chart	1
5.3	Bar graph , And Line graph	1
5.4	Venn Diagram	1
5.5	Data sufficiency	2
	Total	**30**

Course Designer

1. R. Poovarasan - poovarasan@ksrct.ac.in

K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215 (An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted in 2024-2025)

SIXTH SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal	Weightage of Marks	Minimum Marks for Pass in End Semester Exam

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

			Exam	Continuous Assessment *	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 CS 601	Cryptography and Network Security	2	40	60	100	45	100
2	60 CS 602	Principles of Compiler Design	2	40	60	100	45	100
3	60 CS 603	Data Science	2	40	60	100	45	100
4	60 CS E2*	Professional Elective–II	2	40	60	100	45	100
5	60 CS E3*	Professional Elective– III	2	40	60	100	45	100
6	60 OE L0*	Open Elective-III	2	40	60	100	45	100
PRACTICAL								
7	60 CS 6P1	Cryptography and Network Security Laboratory	3	60	40	100	45	100
8	60 CS 6P2	Data Science Laboratory	3	60	40	100	45	100
9	60 CS 6P3	Mini Project	3	60	40	100	45	100
10	60 CG 0P5	Comprehension Test	3	100	-	100	-	100
11	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination and 40 marks for practical End Semester Examination.

60 CS 601	Cryptography and Network Security	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

- To know about various encryption techniques
- To understand the concept of Public key cryptography and number theory
- To study about message authentication and hash functions To understand key management and user authentication
- To impart knowledge on Network security and web security

Pre-requisites

- Computer Networks, Mathematical Knowledge, Programming Knowledge and Data Structures

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand various Cryptographic Techniques and symmetric key cryptography techniques to solve real world problems	Understand
CO2	Apply various public key cryptography techniques to real case scenarios	Apply
CO3	Apply Hashing and Digital Signature techniques to solve the problems.	Apply
CO4	Demonstrate the various mutual trust and User authentication mechanisms.	Apply
CO5	Determine the appropriate Security Protocols and standards for the given application.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	-	-	-	2	3	3	2	3	2	3	-
CO2	3	3	3	-	-	-	-	2	3	3	2	3	2	3	-
CO3	3	2	3	-	-	-	-	2	3	3	2	3	2	3	-
CO4	3	2	3	-	-	-	-	2	3	3	2	3	2	3	-
CO5	3	2	3	-	-	-	-	2	3	3	2	3	2	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	40	40	50
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

CHAIRMAN
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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS 601 - Cryptography and Network Security								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction* Computer Security Concepts – The OSI Security Architecture – Security Attacks – services and mechanisms – Model for Network Security – Classical encryption techniques – Block ciphers and Data Encryption Standard – Advanced Encryption Standard – Block cipher operation.	[9]
Public key cryptography* Public key cryptography and RSA – Other Public key cryptosystems – Diffie-Hellman Key Exchange - Elgamal Cryptographic System – Elliptic Curve Arithmetic – Elliptic Curve Cryptography.	[9]
Message authentication and integrity* Cryptographic hash functions – Message authentication codes: Message Authentication Requirements – Message Authentication Functions – Requirements for Message Authentication Codes – Security of MACs – MACs Based on Hash Functions: HMAC – Digital signatures: Elgamal Digital Signature Scheme – Schnorr Digital Signature Scheme – NIST Digital Signature Algorithm – Elliptic Curve Digital Signature Algorithm.	[9]
Key management and User authentication* Key management and distribution: symmetric key distribution using symmetric and asymmetric encryption – Distribution of public keys – X.509 Certificates – Public key infrastructure – Remote user authentication principles – Remote user authentication using symmetric and asymmetric encryption – Kerberos – Federated identity management – Personal identity verification.	[9]
Network and Internet Security* Network access control and cloud security – Transport level security – Wireless network security – Electronic mail security – IP security-Intruders, Malicious Software, Viruses and Related Threats, Counter Measures, Firewalls and its Design Principles. **Quantum cryptography** – Introduction, Types and techniques.	[9]
Total Hours:	**45**

Text Book(s):	
1.	William Stallings, "Cryptography and Network Security", 7th Edition, Pearson Education, 2017.
2.	Behrouz A. Ferouzan & Debdeep Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata Mc Graw Hill, 2015.
Reference(s):	
1.	Charles P Fleeger, "Security in Computing", 5th Edition, Prentice Hall of India, 2015.
2.	Niels Ferguson, “Cryptography Engineering: Design Principles and Practical Applications”, Wiley, First Edition, 2010
3.	Jean-Philippe Aumasson,” SERIOUS CRYPTOGRAPHY A Practical Introduction to Modern Encryption”, William Pollock publisher,1st Edition,2018
4.	Atul Kahate, Cryptography and Network Security, TMH. (2013)

*SDG 9 – Industry Innovation and Infrastructure

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Computer Security Concepts	1
1.2	The OSI Security Architecture	1
1.3	Security Attacks	1
1.4	services and mechanisms	1
1.5	Model for Network Security	1
1.6	Classical encryption techniques	1
1.7	Block ciphers and Data Encryption Standard	1
1.8	Advanced Encryption Standard	1
1.9	Block cipher operation	1
2.0	**Public key cryptography**	
2.1	Public key cryptography and RSA	2
2.2	Other Public key cryptosystems	1
2.3	Diffie-Hellman Key Exchange	2
2.4	Elgamal Cryptographic System	1
2.5	Elliptic Curve Arithmetic	1
2.6	Elliptic Curve Cryptography	2
3.0	**Message authentication and integrity**	
3.1	Cryptographic hash functions	1
3.2	Message authentication codes: Message Authentication Requirements	1
3.3	Message Authentication Functions	1
3.4	Requirements for Message Authentication Codes	1
3.5	Security of MACs – MACs Based on Hash Functions: HMAC	1
3.6	Digital signatures: Elgamal Digital Signature Scheme	1
3.7	Schnorr Digital Signature Scheme	1
3.8	NIST Digital Signature Algorithm	2
3.9	Elliptic Curve Digital Signature Algorithm.	1
4.0	**Key management and User authentication**	
4.1	Key management and distribution: symmetric key distribution using symmetric and asymmetric encryption	1
4.2	Distribution of public keys	1
4.3	X.509 Certificates	1
4.4	Public key infrastructure	1
4.5	Remote user authentication principles	1

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.6	Remote user authentication using symmetric and asymmetric encryption	1
4.7	Kerberos	1
4.8	Federated identity management	1
4.9	Personal identity verification	1
5.0	**Network and Internet Security**	
5.1	Network access control and cloud security	1
5.2	Transport level security	1
5.3	Wireless network security	1
5.4	Electronic mail security – IP security	2
5.5	Intruders, Malicious Software	1
5.6	Viruses and Related Threats, Counter Measures	2
5.7	Firewalls and its Design Principles	1
5.8	Quantum cryptography – Introduction, Types and techniques	

Course Designer(s)

1. Ms. J. Mythili – mythili@ksrct.ac.in

60 CS 602	Principles of Compiler Design	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To learn the various phases of compiler and lexical analysis
- To understand the concepts of syntax analysis and its parsing techniques
- To learn and understand the translation of statements processes involved in intermediate code generation
- To understand the design issues of runtime environment and code generation
- To know the importance of code optimization techniques

Pre-requisites

- Discrete Mathematics, Formal Language and Automata Theory

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basics of compilers and the phases of a compiler.	Understand
CO2	Interpret the role of the syntax analysis and parsing techniques	Analyse
CO3	Examine the processes involved in intermediate code generation	Analyse
CO4	Investigate the design issues of a code generator and target machine.	Apply
CO5	Apply and analyze the code optimization techniques.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	-	2	-	3	3	1	3	3	3	-

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO2	3	3	3	3	3	-	2	-	3	2	3	2	3	3	-
CO3	3	3	2	2	3	-	2	-	3	2	1	2	3	2	-
CO4	3	2	2	1	2	-	2	-	2	3	2	3	3	2	-
CO5	3	3	3	2	2	-	2	-	2	2	1	3	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	5	5	10
Understand	15	15	20
Apply	20	20	30
Analyse	20	20	40
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS 602 – Principles of Compiler Design

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	1	0	60	4	40	60	100

COMPILER AND LEXICAL ANALYSIS* Introduction to Compilers – Structure of Compiler – Phases of Compiler – Cousins of Compiler – Grouping of Phases – Compiler Construction Tools. Role of the Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – A Language for Specifying Lexical Analyzer.	[9]
SYNTAX ANALYSIS* The Role of the Parser – Context-Free Grammars – Writing a Grammar – Top Down Parsing – Recursive Descent Parser –- Predictive Parser – LL(1) Parser – Bottom-Up Parsing – Shift Reduce Parser – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser.	[9]
INTERMEDIATE CODE GENERATION* Intermediate Languages – Three-Address Code – Types and Declarations –Translation of Expressions – Rules for Type Checking and Type Conversions –Control Flow –Back patching – Switch Statements – Procedures.	[9]
RUN-TIME ENVIRONMENT AND CODE GENERATION* Runtime Environments – Source Language Issues - Storage Organization – Storage Allocation Strategies – Static, Stack and Heap Allocation – Parameter Passing – Symbol Tables – Dynamic Storage Allocation – Issues in the Design of a Code Generator – Basic Blocks and Flow graphs – Design of a Simple Code Generator – Optimal Code Generation for Expressions – Dynamic Programming Code Generation.	[9]

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CODE OPTIMIZATION* Principal Sources of Optimization – Peep-hole Optimization – DAG- Optimization of Basic Blocks – Global Data Flow Analysis – Efficient Data Flow Algorithm – Recent Trends in Compiler Design.		[9]
	Total Hours:	**45**
Text Book(s):		
1.	Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers Principles, Techniques and Tools”, Second Edition, Pearson Education, 2012.	
2.	Santanu Chattopadhyay, “Compiler Design”, Second Edition, PHI Learning, 2011.	
Reference(s):		
1.	Raghavan V, “Principles of Compiler Design”, Tata McGraw-Hill Education, 2010.	
2.	Allen I. Holub, “Compiler Design in C”, Second Edition, Prentice Hall of India, 2003.	
3.	Fisher C N and LeBlanc R J, “Crafting a Compiler with C”, Second Edition Benjamin Cummings, 2008.	
4.	Bennet J P, “Introduction to Compiler Techniques”, Second Edition, Tata McGraw-Hill, 2003.	
5.	David Galles, “Modern Compiler Design”, Pearson Education Asia, 2007.	
6.	Muneeswaran K, “Compiler Design”, Oxford University Press, 2013.	

*SDG 4 – Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**COMPILER AND LEXICAL ANALYSIS**	
1.1	Introduction to Compilers, Structure of Compiler	1
1.2	Phases of Compiler	1
1.3	Cousins of Compiler, Grouping of Phases	1
1.4	Compiler Construction Tools	1
1.5	Role of the Lexical Analyzer	1
1.6	Input Buffering	1
1.7	Specification of Tokens, Recognition of Tokens	1
1.8	A Language for Specifying Lexical Analyzer	1
2.0	**SYNTAX ANALYSIS**	
2.1	The Role of the Parser	1
2.2	Context-Free Grammars, Writing a Grammar	1
2.3	Top Down Parsing, Recursive Descent Parser	1
2.4	Predictive Parser, LL(1) Parser	2
2.5	Bottom-Up Parsing, Shift Reduce Parser	1
2.6	LR Parsers, SLR Parser	2
2.7	Canonical LR Parser	1

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.8	LALR Parser	1
3.0	**INTERMEDIATE CODE GENERATION**	
3.1	Intermediate Languages	1
3.2	Three-Address Code	1
3.3	Types and Declarations	1
3.4	Translation of Expressions	1
3.5	Rules for Type Checking and Type Conversions	1
3.6	Control Flow	1
3.7	Back patching	2
3.8	Switch Statements, Procedures	1
4.0	**RUN-TIME ENVIRONMENT AND CODE GENERATION**	
4.1	Runtime Environments, Source Language Issues	1
4.2	Storage Organization	1
4.3	Storage Allocation Strategies, Static, Stack and Heap Allocation	1
4.4	Parameter Passing, Symbol Tables	1
4.5	Dynamic Storage Allocation	1
4.6	Issues in the Design of a Code Generator, Basic Blocks and Flow graphs	1
4.7	Design of a Simple Code Generator	1
4.8	Optimal Code Generation for Expressions	1
4.9	Dynamic Programming Code Generation	1
5.0	**CODE OPTIMIZATION**	
5.1	Principal Sources of Optimization	1
5.2	Peephole Optimization	1
5.3	DAG, Optimization of Basic Blocks	2
5.4	Global Data Flow Analysis	2
5.5	Efficient Data Flow Algorithm	2
5.6	Recent Trends in Compiler Design	1

Course Designer(s)

1. Dr.R.Gopinath - gopinath@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS 603	Data Science	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To impart necessary knowledge of the mathematical foundations needed for data science and develop programming skills required to build data science applications

Pre-requisites

- Fundamentals in linear algebra / statistics / probability

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basics of Data Sciences	Understand
CO2	Know the mathematical foundations needed for Data Science and perform Exploratory Data Analysis	Analyze
CO3	Implement models such as k-nearest Neighbors, Naive Bayes, linear and logistic Regression, decision trees, neural networks and clustering	Analyze
CO4	Create effective visualization of given data	Apply
CO5	Build data science applications	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	-	-	2	-	-	-		-	-	1	2	3	2
CO2	3	3	3	2	3	3	-	-	2	-	2	2	2	3	3
CO3	3	3	3	3	3	-	-	-	2	-	2	2	2	3	3
CO4	3	3	3	2	3	-	-	-	2	-	-	3	2	3	3
CO5	2	3	3	3	3	3	3	-	2	-	2	3	2	3	2

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	15	15	20
Apply	20	20	40
Analyse	15	15	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS 603 – Data Science

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction to core concepts and technologies* Introduction, Terminology, Data-Properties of Data, Types of data, Why Data Science? Computer Science, Data Science, and Real Science, data science process, Data Acquisition and Data Science Life Cycle, Ethics in Data Science, data science toolkit, Example applications. Data wrangling: Sources of data, Data collection and API, Working with data: Reading Files, Cleaning Data.	[8]
Statistical Inference, Exploratory Data Analysis* Statistical thinking in Data Science, Statistical Inference, Statistical Analysis - Mean, Median, Mode, Standard Deviation, Range, Percentile, Modeling, Exploratory Data Analysis: Philosophy of Exploratory Data Analysis, Data visualization, Missing value analysis, The correction matrix, Outlier detection analysis.	[9]
Basic Machine Learning Algorithms** Brief introduction, Linear / Polynomial Regression, Logistic Regression, Classification, Regularization, Support vector machines, Naive Bayes, Cross Validation, Label Encoding, Random Forests, Decision Trees, Clustering, Dimensionality reduction, Manifold learning, 2D/3D Convolution.	[8]
Data visualization** Introduction, Types of data visualization, Data Visualization - Basic principles, ideas and tools for basic data visualization tools (plots, graphs and summary statistics)- various visualization techniques used in Data Science. Data visualization Tool: Overview of Power BI , Key features and capabilities ; Data Preparation -Connecting to Various Data Sources (SQL, Excel, Web.) , Data Transformation using Power Query, Data Cleaning and Data Profiling ; Data Visualization-Building Basic Visualizations (Bar charts, Line charts, etc.) , Designing Interactive Dashboards , Applying Filters and Slicers	[12]
Applications of Data Science** Case Studies of Data Science Application, Recommender Systems on Real-World Data Sets, Weather forecasting, Stock market prediction, Object recognition, Matching Skills to Job.	[8]
Total Hours:	**45**

Text Book(s):	
1.	Cathy O'Neil, Rachel Schutt, Doing Data Science, Straight Talk from The Frontline. O'Reilly, 2013.
2.	Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media
Reference(s):	
1.	Jure Leskovek, Anand Rajaraman, Jeffrey Ullman, Mining of Massive Datasets. v2.1, Cambridge University Press, 2014.
2.	Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media
3.	Jeeva Jose, "Machine Learning", Khanna Publishing House, Delhi.
4.	Jack A.Hyman,"Microsoft Power BI for Dummies", Wiley India,2023
5.	Jain V.K., "Data Sciences", Khanna Publishing House, Delhi.

*SDG 12 – Responsible Consumption and Production

**SDG 13 – Climate Action

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Introduction to core concepts and technologies**	
1.1	Importance of Subject, syllabus, COs, POs and PSOs - Introduction, Terminology, Data	1
1.2	Properties of Data, Types of data, Why Data Science?	1
1.3	Computer Science, Data Science, and Real Science, data science process	1
1.4	Data Acquisition and Data Science Life Cycle	1
1.5	Ethics in Data Science	1
1.6	Data science toolkit, Example applications - Data wrangling	1
1.7	Sources of data, Data collection and API	1
1.8	Working with data: Reading Files, Cleaning Data	1
2.0	**Statistical Inference, Exploratory Data Analysis**	
2.1	Statistical thinking in Data Science - Statistical Inference	1
2.2	Statistical Analysis	1
2.3	Modeling	1
2.4	Exploratory Data Analysis	1
2.5	Philosophy of Exploratory Data Analysis	1
2.6	Data visualization	1
2.7	Missing value analysis	1
2.8	The correction matrix	1
2.9	Outlier detection analysis	1
3.0	**Basic Machine Learning Algorithms**	
3.1	Brief introduction, Linear / Polynomial Regression	1
3.2	Logistic Regression, Classification, Regularization,	1
3.3	Support vector machines	1
3.4	Naive Bayes, Cross Validation	1
3.5	Label Encoding, Random Forests, Decision Trees	1
3.6	Clustering, Dimensionality reduction	1
3.7	Manifold learning - 2D/3D Convolution	1
3.8	Introduction to Neural Networks, Evaluation Metrics	1
4.0	**Data visualization**	
4.1	Introduction, Types of data visualization	1
4.2	Data Visualization	1
4.3	Basic principles	1
4.4	Ideas and tools for basic data visualization tools (plots)	1
4.5	Various visualization techniques used in Data Science	1

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.6	Overview of Power BI , Key features and capabilities Connecting to Various Data Sources (SQL, Excel, Web.)	2
4.7	Data Transformation using Power Query, Data Cleaning and Data Profiling	1
4.8	Create your own visualization of a complex dataset	2
4.9	Building Basic Visualizations (Bar charts, Line charts, etc.) , Designing Interactive Dashboards , Applying Filters and Slicers	2
5.0	**Applications of Data Science**	
5.1	Case Studies of Data Science Application	4
5.2	Recommender Systems on Real World Data Sets 01	4

Course Designer(s)

1. Dr.B.G.Geetha - geetha@ksrct.ac.in

60 MY 003		Category	L	T	P	Credit
	Startups and Entrepreneurship	**MC**	**2**	**0**	**0**	**2***

Objectives

- To Learn basic concepts in entrepreneurship, develop mind-set and skills necessary to explore entrepreneurship
- To provide practical proven tools for transforming an idea into a product or service that creates value for others.
- To Comprehend the process of opportunity identification through design thinking, identify market potential and customers while developing a compelling value proposition solution and prototypes
- To create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture ideas & solutions built with domain expertise
- To Prepare and present an investible pitch deck of their practice venture to attract stakeholders

Pre-requisites

- Basic knowledge of reading and writing in English

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Develop an entrepreneurial mindset and appreciate the concepts of design thinking, entrepreneurship and innovation	Understand
CO2	Apply process of problem -opportunity identification and validation through human centred approach to design thinking in building solutions	Apply
CO3	Understand market types, conduct market estimation, identify customers, create customer persona, develop the skills to create a compelling value proposition and build a Minimum Viable Product	Apply
CO4	Create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture	Apply
CO5	Prepare and deliver an investible pitch deck of their practice venture to attract stakeholders	Create

Mapping with Programme Outcomes

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	1	3	1	2	1	-	2	2	3	3	-
CO2	2	3	3	2	2	-	2	2	2	-	2	2	2	3	-
CO3	3	2	3	1	2	-	-	-	1	3	1	3	3	2	-
CO4	3	3	3	3	3	2	2	1	-	1	3	3	3	3	-
CO5	3	2	3	3	3	-	-	2	-	-	3	2	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Pitch Deck final submission & Via voce
	Milestone 1 (25 Marks)	Milestone 2 & 3 (25 Marks)	
Remember	10	-	50
Understand	05	10	
Apply	10	15	
Analyse	-	-	
Evaluate	-	-	
Create	-	-	
Total	25	25	

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
Common to ALL Branches							
60 MY 003 – Startups and Entrepreneurship							
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	0	30	2*	100	-	100

Introduction to Entrepreneurship & Entrepreneur Meaning and concept of Entrepreneurship, the history of Entrepreneurship development, Myths of Entrepreneurship, role of Entrepreneurship in Economic Development, Agencies in Entrepreneurship Management and Future of Entrepreneurship. The Entrepreneur: Meaning, the skills required to be an entrepreneur, the entrepreneurial decision process, Role models, Mentors and Support system.Innovation and Creativity, types of innovations, Innovations in current scenario	[6]
Problem-Opportunity Identification, Customers Discovery and competitive advantage Understanding the Problem and opportunity, define problem using Design thinking principles and validate problem. Exploring market types and estimating the market size, knowing your customer and consumer, Customer segmentation and creating customer personas. Importance of Value Proposition, Value Proposition Canvas, Developing Problem-solution fit, Competition analysis, Blue ocean strategy, Competitive positioning and understanding unique selling points.	[6]
Business model and build your MVP Introduction to Business model and types, Lean approach, 9 block lean canvas model, riskiest assumptions to Business models. Prototyping, building a Minimum viable product, Hypothesis testing and MVP Validation, MVP Iteration-Importance of Build - Measure – Learn approach	[6]

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Business Plan, Financial feasibility and Managing growth Business planning: components of Business plan- Sales plan, People plan and financial plan, Preparing a business plan. Financial Planning: Types of costs, preparing the financial plan using financial template, understanding basics of Unit economics and analyzing Growth and the financial performance	[6]
Go To Market Strategies and Funding Introduction to Go to market strategies, start-up branding and its elements, Selecting the Right Channel, creating digital presence, building customer acquisition strategy. Choosing a form of business organization specific to your venture, identifying sources of funds: Debt & Equity, Map the Start-up Lifecycle to Funding Options, Build an Investor ready pitch deck.	[6]
Total Hours	30

Text Book(s):	
1.	Stephen Key, "One Simple Idea for Startups and Entrepreneurs: Live Your Dreams and Create Your Own Profitable Company" 1st Edition, Tata Mc Grawhill Company, New Delhi, 2013.
2.	Charles Bamford and Garry Bruton, "Entrepreneurship: The Art, Science, and Process for Success", 2nd Edition, Tata Mc Grawhill Company, New Delhi, 2016.
Reference(s):	
1.	Philip Auerswald, "The Coming Prosperity: How Entrepreneurs Are Transforming the Global Economy", Oxford University Press, 2012.
2.	Janet Kiholm Smith; Richard L. Smith Richard T. Bliss, "Entrepreneurial Finance: Strategy, Valuation and Deal Structure, Stanford Economics and Finance", 2011.
3.	Edward D. Hess, "Growing an Entrepreneurial Business: Concepts and Cases", Stanford Business Books, 2011.
4.	Ignite program, wadhwani platform, Entrepreneurship, NPTEL online course By Prof. C Bhaktavatsala Rao | IIT Madras

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Entrepreneurship & Entrepreneur**	
1.1	Meaning and concept of Entrepreneurship and the history of Entrepreneurship development	1
1.2	The Entrepreneur: Meaning, the skills required to be an entrepreneur, the entrepreneurial decision process,	1
1.3	Myths of Entrepreneurship, How to Become a Successful Entrepreneur - Dr Romesh Wadhwani (Platform on boarding)	1
1.4	Role models, Mentors and Support system- Masterclass on My Story - Joshua Salins	1
1.5	Role of Entrepreneurship in Economic Development, Agencies in Entrepreneurship Management and Future of Entrepreneurship	1
1.6	Innovation and Creativity, types of innovations, Innovations in current scenario, Concepts of Entrepreneurial Thinking, General Enterprising tendency test	1
2.0	**Problem-Opportunity Identification, Customers Discovery and competitive advantage**	

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.1	Understanding the Problem and opportunity, define problem using Design thinking principles and validate problem. Case study and Fireside chat – Desi Hangover	1
2.2	Identifying a problem for practice venture and filling Problem statement canvas (Handout week 1 - class activity)	1
2.3	Customer and markets discovery , knowing your customer and consumer, Customer segmentation and Exploring market types and estimating the market size. Case study and Fireside chat – Verloop	1
2.4	Creating customer personas & Market estimation (Handout week 2 - class activity)	1
2.5	Importance of Value Proposition, Introduce Value Proposition Canvas, Developing Problem-solution fit. Case study and Fireside chat – Honey Twigs	1
2.6	Competition analysis, Blue ocean strategy, Competitive positioning and understanding unique selling points. Case study and Fireside chat on Inzpira Fill Value Proposition Canvas (Handout week 3 - class activity) and Competition analysis framework (Handout week 5 - class activity) **Briefing on Assignment 1 - Milestone 1**	1
3.0	**Business model and Build your MVP**	
3.1	Introduction to Business model and types. Case study and Fireside chat – NUOS	1
3.2	Lean approach, 9 block lean canvas model, riskiest assumptions to Business models	1
3.3	Class Activity- Fill Lean canvas for you idea and understand revenue model (Handout week 6)	1
3.4	Prototyping, Meaning of MLP , Difference between MLP and MVP, How to build an MLP? Different types MLP that you can build. Case study and Fireside chat – KNORISH	1
3.5	Hypothesis testing and MVP Validation, MVP Iteration-Importance of Build - Measure – Learn approach	1
3.6	Class Activity- Fill MVP framework (Handout week 7) and learn validation	1
4.0	**Business Plan, Financial feasibility and Manging growth**	
4.1	Business planning: components of Business plan- Sales plan, People plan and financial plan, Preparing a business plan. Case study and Fireside chat – Bodh Gems	1
4.2	Financial Planning: Types of costs, preparing the financial plan using financial template (Handout week 9)	1
4.3	Class activity - starting up costs, COGS, Sales plan and people plan template.	1
4.4	Class activity - One year P&L projection, Breakeven Analysis, Five year projection	1
4.5	Understanding basics of Unit economics and analyzing Growth and the financial performance	1
4.6	Class activity - Financial template - Unit economics (Handout week 12)	1
5.0	**Go To Market Strategies and Funding**	
5.1	Introduction to Go to market strategies, start-up branding and its elements, Selecting the Right Channel	1
5.2	Creating digital presence, building customer acquisition strategy.	1
5.3	Class activity: Handout week 10 - create your GTM strategy	1
5.4	Choosing a form of business organization specific to your venture	1

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.5	Identifying sources of funds: Debt & Equity, Map the Start-up Lifecycle to Funding Options	1
5.6	Class activity - Visit relevant GOI websites, other sites to help students explore funding opportunities and **briefing on final submission of the pitch deck** Build an Investor ready pitch deck, What Should You Cover in Your Pitch Deck? Art of pitching and storytelling	1

Course Designer(s)

1. Dr.N.Tiruvenkadam - tiruvenkadam@ksrct.ac.in

60 CS 6P1	Cryptography and Network Security Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To learn different cipher techniques
- To analyze encryption schemes and algorithms
- To establish digital signatures, hash functions, and signature Standards.
- To utilize network security tools and vulnerability assessment tools
- To implement network security and web security

Pre-requisites

Computer Networks, Mathematical Knowledge, Programming Knowledge and Data Structures

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Develop code for classical Encryption Techniques to solve the problems.	Apply
CO2	Build cryptosystems by applying symmetric and public key encryption algorithms.	Apply
CO3	Construct code for authentication algorithms.	Apply
CO4	Develop a signature scheme using Digital signature standard.	Apply
CO5	Demonstrate the network security system using open source tools.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	-	-	-	2	3	3	2	3	3	3	-
CO2	3	3	3	-	-	-	-	2	3	3	2	3	3	3	-
CO3	3	2	3	-	-	-	-	2	3	3	2	3	3	2	-
CO4	3	2	3	-	-	-	-	2	3	3	2	3	3	2	-
CO5	3	2	3	-	-	-	-	2	3	3	2	3	3	2	-

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	50	25	100	100
Analyse	-		-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS 6P1 – Cryptography and Network Security Laboratory

Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	0	0	4	60	2	60	40	100

List of Experiments:

1. Perform encryption, decryption using the following substitution techniques*
   i. Ceaser cipher ii. Playfair cipher iii. Hill Cipher iv. Vigenere cipher
2. Perform encryption and decryption using following transposition techniques*
   i. Rail fence - Row & Column Transformation
3. Apply DES algorithm for practical applications*
4. Apply AES algorithm for practical applications*
5. Implement RSA Algorithm using HTML and JavaScript*
6. Implement the Diffie-Hellman Key Exchange algorithm for a given problem*
7. Calculate the message digest of a text using the SHA-1 algorithm*
8. Implement the SIGNATURE SCHEME - Digital Signature Standard*
9. Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w*
10. Automated Attack and Penetration Tools Exploring N-Stalker, a Vulnerability Assessment Tool*
11. Defeating Malware - Building Trojans, Rootkit Hunter*

*SDG 9 – Industry Innovation and Infrastructure

Course Designer(s)

1. Ms.J. Mythili – mythili@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS 6P2	Data Science Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To demonstrate Data exploration and preprocessing
- To investigate Linear and Logistic regression, Naive Bayes classifier model and regularized logistic regression
- To study the performance of ensemble techniques and decision trees To know SVM with different kernels and kNN algorithm to classify a dataset. To develop effective visualization of given data.

Pre-requisites

- Fundamentals in linear algebra / statistics / probability

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand Data exploration and preprocessing.	Apply
CO2	Implement models such as Linear and Logistic regression, Naive Bayes classifier model and regularized logistic regression.	Analyze
CO3	Implement models such as Ensemble techniques, Decision trees.	Apply
CO4	Build model using SVM with different kernels and kNN algorithm to classify a dataset.	Apply
CO5	Create effective visualization of given data.	Analyze

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	-	-	2	-	-	-	-	-	-	1	2	3	-
CO2	3	3	3	2	3	3	-	-	2	-	2	2	2	3	-
CO3	3	3	3	3	3	-	-	-	2	-	2	2	2	3	-
CO4	3	3	3	2	3	-	-	-	2	-	-	3	2	3	-
CO5	2	3	3	3	3	3	3	-	2	-	2	3	2	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	25	12	50	50
Analyse	25	13	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS 6P2 – Data Science Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	0	0	4	60	2	60	40	100

List of Experiments:

1. Perform Data exploration and preprocessing*
2. Implement Linear and Logistic regression*
3. Implement Naive Bayes classifier for dataset stored as CSV file.*
4. Implement regularized logistic regression*
5. Build models using different Ensembling techniques*
6. Build models using Decision trees*
7. Build model using SVM with different kernels*
8. Implement K-NN algorithm to classify a dataset*
9. Connect to Various Data sources (SQL,EXCEL,WEB) using Power BI*
10. Perform Data Cleaning and Transformation Challenge by using Power BI*

Mini project to predict the time taken to solve a problem given the current status of the user.

*SDG 13 – Climate Action

Course Designer(s)

1. Dr.B.G.Geetha – geetha@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS 6P3	Mini Project	Category	L	T	P	Credit
		CG	0	0	2	1

Objectives

- To Imparting the practical knowledge to the students and also make them to apply the technical procedures in their project work

Pre-requisites

All Courses

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify a problem in the domain of interest	Apply
CO2	Perform literature survey and identify the existing issues	Apply
CO3	Identify the possible solutions	Apply
CO4	Identify tools and techniques to implement the project	Apply
CO5	Prepare technical report	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Internal Assessment: 100 Marks

Review I (R1)			Review II (R2)		Review III (R3)			Total (R1+R2 +R3)	Internal
Literature Survey	Topic Identification & Justification	Work Plan	Approach	Conclusion	Demo	Presentation	Report	Total	
10	10	10	20	20	10	10	10	100	100

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 CS 6P3 – Mini Project							
Semester	Hours/Week			Total Hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

VI	0	0	2	30	1	100	00	100

1. Three reviews have to be conducted by the committee of minimum of three members one of which should be the guide
2. Problem should be selected
3. Students have to collect about 20 papers related to their work
4. Implementation should be done
5. Reports has to be prepared by the students as per the format in Annexure – 1 Internal evaluation has to be done for 100 Marks

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CG 0P5	Comprehension Test*	Category	L	T	P	C	CA	ES	Total
Semester VI		CG	0	0	2	1*	100	-	100

Objectives

- To evaluate the knowledge gained in core courses relevant to the programme of study.
- To assess the technical skill in solving complex engineering problems.

Prerequisite

Fundamental knowledge in all core subjects.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Infer knowledge in their respective programme domain.	Apply
CO2	Attend interviews for career progression	Apply
CO3	Exhibit professional standards to solve engineering problems	Apply
CO3	Promote holistic approach to problem solving	Apply
CO5	Examine the competency of graduates in specific programme domain	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2					1	2	2	3
CO2	3	3	2	2					1	2	2	3
CO3	3	3	2	2					1	2	2	3
CO4	3	3	2	2					1	2	2	3
CO5	3	3	2	2					1	2	2	3
3- Strong;2-Medium;1-Some												

Assessment Pattern

The overall knowledge of the candidate in various courses he/she studied shall be evaluated with multiple choice questions.

***SDG:4- Quality Education**

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS
(For the candidates admitted in 2024-2025)

SEVENTH SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment *	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 HS 002	Engineering Economics and Financial Accounting	2	40	60	100	45	100
2	60 CS 701	Cloud Computing	2	40	60	100	45	100
3	60 CS 703	Software Testing	2	40	60	100	45	100
4	60 CS E4*	Professional Elective– IV	2	40	60	100	45	100
5	60 AC 001	Research Skill Development	2	100	-	100	-	100
THEORY CUM PRACTICAL								
6	60 CS 702	Deep Learning	2	50	50	100	45	100
7	60 AB 00*	NCC\NSS\NSO\ YRC\RRC\Yoga \Fine Arts	2	50	50	100	45	100
PRACTICAL								
8	60 CS 7P1	Cloud Computing Laboratory	3	60	40	100	45	100
9	60 CS 7P2	Project Work Phase - I	3	100	-	100	-	100
10	60 CG 0P6	Internship	-	100	-	100	-	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination, 50 marks for theory cum practical End Semester Examination and 40 marks for practical End Semester Examination.

60 HS 002	Engineering Economics and Financial Accounting	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To know about the economic principles underlying demand, supply, and market structure
- To understand the concept related to types of business organization and types of banking
- To know about concepts in financial accounting and capital budgeting
- To understand the different methods of pricing and appraisal of projects
- To know the application of break-even analysis in engineering projects

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Summarize the basic concepts of economics, demand, supply, and market structure	Understand
CO2	Interpret the forms of business organization and functions of commercial and central bank	Understand
CO3	Examine the basis of financial accounting and capital budgeting techniques	Analyse
CO4	Demonstrate the different types of pricing strategies and comprehensive project feasibility in diverse business	Apply
CO5	Demonstrate the break even analysis in engineering projects and business	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	2	3	-	3	-	-	-	3	2	3	3	-
CO2	-	-	-	-	-	2	2	-	-	-	3	3	-	3	-
CO3	-	-	2	3	-	-	-	-	-	-	3	-	2	2	-
CO4	2	-	-	3	-	2	-	-	-	-	-	3	3	3	-
CO5	3	3	3	3	-	-	2	2	-	-	2	2	3	2	-

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	25	15	25
Understand	35	25	45
Apply	-	10	20
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to Civil, EEE, ECE, CSE, IT, AI&DS, AIML, CSBS, EE (VLSI D&T), BT, FT								
60 HS 002 - Engineering Economics and Financial Accounting								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Basic Economics Definition of Economics – Nature and Scope of Economics, Basic Concepts of Economics, Factors of Production - Definition of Demand – Law of Demand, Exception to Law of Demand, Factors Affecting Demand, Elasticity of Demand, Demand Forecasting – Definition of Supply – Factors Affecting Supply, Elasticity of Supply – Market Structure – Perfect Competition, Imperfect Competition – Monopoly, Duopoly, Oligopoly, and Bilateral Monopoly.	[9]
Organization and Business Financing* Forms of Business – Sole Proprietorship, Partnership, Joint Stock Company, Cooperative Organization, State Enterprise - Mixed Economy - Money and Banking – Kinds of Banking, Functions of Commercial Banks and Central Bank – Definition of Monetary Policy and its Types – Types of financing - Short Term Borrowing, Long Term Borrowing - Internal Generation of Funds – External Commercial Borrowings.	[9]
Financial Accounting and Capital Budgeting The Balance Sheet and Related Concepts – The Profit and Loss Statement and Related Concepts – Financial Ratio Analysis – Definition of Working Capital – Types, Factors – Definition of Capital Budgeting - Techniques – Average Rate of Return, Payback Period, Net Present Value, Profitability Index Method and Internal Rate of Return..	[9]
Cost Analysis Types of Costing – Traditional Costing Approach - Activity Based Costing - Fixed Cost – Variable Cost – Marginal Cost – Cost Output Relationship in the Short Run and in Long Run – Pricing Practice – Full Cost Pricing – Marginal Cost Pricing – Going Rate Pricing – Bid Pricing – Pricing for a Rate of Return – Project Appraisal - Appraisal process, - Cost Benefit Analysis – Feasibility Reports –– Technical Feasibility, Economic Feasibility, Financial Feasibility, Managerial Feasibility, Operational Feasibility.	[9]

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Break Even Analysis Basic Assumptions –Break-Even Chart – Profit Zone in Break-Even Chart, Loss Zone in Break-Even Chart, Angle of Incidence – Managerial Uses of Break-Even Analysis, Applications of Break-Even Analysis in Engineering Projects.		[9]
	Total Hours:	**45**
Text Book(s):		
1.	Khan M.Y., Jain P.K., " Financial Management", 8rd Edition, McGraw Hill Education, 2018.	
2.	Maheshwari K.L., Varshney R.L., "Managerial economics", 22nd Edition, S Chand and Co., New Delhi, 2018.	
Reference(s):		
1.	Samuelson P.A., " Economics - An Introductory", 16th Edition, New Age Publications, New Delhi, 2019.	
2.	Barthwal R.R., " Industrial Economics - An Introductory", 4th Edition, New Age Publications, New Delhi, 2021.	
3.	Bhattacharyya S. K., John Deardon, "Accounting for Management Text and Cases", 3rd Edition, S Chand Publication, 2018.	
4.	Mote, V L, Samuel and Gupta, G S., "Managerial Economics – 110002, 1984.– Concepts and Cases", Tata Mcgraw Hill, New Delhi, 2018.	

*SDG 9 – Increase Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Basic Economics**	
1.1	Definition of economics – Nature and Scope of Economics	1
1.2	Basic Concepts of Economics, Factors of Production	1
1.3	Definition of Demand – Law of Demand	1
1.4	Exception to Law of Demand	1
1.5	Factors Affecting Demand, Elasticity of Demand	1
1.6	Demand Forecasting	1
1.7	Definition of Supply – Factors Affecting Supply, Elasticity of Supply	1
1.8	Market Structure – Perfect Competition, Imperfect Competition	1
1.9	Monopoly, Duopoly, Oligopoly, and Bilateral Monopoly	1
2.0	**Organization and Business Financing**	
2.1	Forms of Business – Sole Proprietorship, Partnership	1
2.2	Joint Stock Company, Cooperative Organization, State Enterprise	1
2.3	Mixed Economy - Money and banking	1
2.4	Kinds of Banking	1
2.5	Functions of Commercial Banks and Central Bank	1
2.6	Definition of Monetary Policy and its Types	1
2.7	Types of Financing	1

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.8	Short Term Borrowing, Long Term Borrowing	1
2.9	Internal Generation of Funds, External Commercial Borrowings	1
3.0	**Financial Accounting and Capital Budgeting**	
3.1	The Balance Sheet and Related Concepts	1
3.2	The Profit and Loss Statement and Related Concepts	1
3.3	Financial Ratio Analysis	2
3.4	Definition of Working Capital – Types, Factors	2
3.5	Definition of Capital Budgeting - Techniques	1
3.6	Average Rate of Return, Payback Period	1
3.7	Net Present Value, Profitability Index Method and Internal Rate of Return	1
4.0	**Cost Analysis**	
4.1	Types of Costing - Traditional Costing Approach - Activity Based Costing	1
4.2	Fixed Cost – Variable Cost – Marginal Cost	1
4.3	Cost Output Relationship in the Short Run and in Long Run	1
4.4	Pricing Practice – Full Cost Pricing	1
4.5	Marginal Cost Pricing, Going Rate Pricing	1
4.6	Bid Pricing, Pricing for a Rate of Return	1
4.7	Project Appraisal - Appraisal Process - Cost Benefit Analysis	1
4.8	Feasibility Reports -–– Technical Feasibility, Economic Feasibility	1
4.9	Financial Feasibility, Managerial Feasibility, Operational Feasibility.	1
5.0	**Break Even Analysis**	
5.1	Basic Assumptions – Break-Even Chart	2
5.2	Profit Zone in Break-Even Chart, Loss Zone in Break-Even Chart	2
5.3	Angle of Incidence	1
5.4	Managerial Uses of Break-Even Analysis	2
5.5	Applications of Break-Even Analysis in Engineering Projects	2

Course Designer(s)

1. Mr.V.S.Vijayachander - vijayachander@ksrct.ac.in
2. Dr.E.kalaivani - kalaivanie@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS 701	Cloud Computing	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To provide students with the fundamentals and essentials of Cloud Computing
- To provide students a sound foundation of the Cloud Computing so that they can start using and adopting Cloud Computing services and tools in their real-life scenarios
- To enable students exploring some important cloud computing driven commercial systems and applications
- An understanding of when and where to use it using the appropriate industry models
- To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research

Pre-requisites

- Networking, Databases, Operating Systems

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Know the Characteristics of Cloud computing	Understand
CO2	Illustrate the Cloud service models and Cloud Deployment Models	Apply
CO3	Develop an application using Paas Application frameworks	Apply
CO4	Reveal the major security and privacy problems in the Cloud with security mechanism	Apply
CO5	Understand about cloud simulators	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	2	2	-	-	-	-	-	2	3	-	**3**	-
CO2	3	2	2	2	2	-	-	-	-	-	2	3	-	3	-
CO3	3	2	2	2	2	-	-	-	-	-	2	3	-	3	-
CO4	3	2	2	2	2	-	-	-	-	-	2	2	-	3	-
CO5	3	2	2	2	2	-	-	-	-	-	2	2	-	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	15	15	30
Apply	35	35	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E - Computer Science and Engineering								
60 CS 701 – Cloud Computing								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction Introduction to Cloud Computing, Cloud service providers, Benefits of Cloud Computing, Cloud computing - Cluster computing, Grid computing, Assessing the role of Open Standards, Measuring the cloud's value, Cloud Architecture - Exploring the cloud computing stack.	[9]
Cloud Computing Architecture & Infrastructure as a Service Cloud computing stack, Service Models (XaaS) - Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Deployment Models - Public, Private, Hybrid and Community Cloud, Infrastructure as a Service (IaaS), Resource Virtualization - Server, Storage, Network.	[9]
Platform as a Service & Software as a Service* Introduction to PaaS, Cloud Platform and Management - Computation, Storage, Software as a Service (PaaS) - Introduction, Web Services, Web 2.0, Web OS, Service Management in Cloud Computing - Service Level Agreements (SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Managing Data in Cloud.	[9]
Cloud Security and Storage* Infrastructure Security, Data security and Storage - Data privacy and security Issues, Jurisdictional issues, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations, Cloud Storage - Cloud Array, Shared Cloud Storage.	[9]
Cloud Simulators Introduction to VMWare Simulator Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine. CloudSim - Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Douglas Comer and Douglas Comer, "The Cloud Computing Book, The Future of Computing Explained", 2021.
2.	Barrie Sosinsky, "Cloud Computing Bible", Wiley, 2011.
Reference(s):	
1.	Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", Wiley, 2011
2.	Nikos Antonopoulos, Lee Gillam, "Cloud Computing: Principles, Systems and Applications", Springer, 2012
3.	Ronald L. Krutz, Russell Dean Vines, "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley, 2010

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.	Anthony T.Velte , Toby J. Velte Robert Elsenpeter, “Cloud computing a practical approach”, TATA McGraw- Hill , New Delhi – 2010

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Introduction**	
1.1	Introduction to Cloud Computing	1
1.2	Cloud service providers	1
1.3	Benefits of cloud computing	1
1.4	Cluster computing	1
1.5	Grid computing	1
1.6	Assessing the role of Open Standards	1
1.7	Measuring the cloud’s value	1
1.8	Cloud Architecture	1
1.9	Exploring the cloud computing stack	1
2	**Cloud Computing Architecture & Infrastructure as a Service**	
2.1	Cloud computing stack	1
2.2	Service Models (XaaS)	1
2.3	Infrastructure as a Service (IaaS)	1
2.4	Platform as a Service (PaaS)	1
2.5	Software as a Service (SaaS)	1
2.6	Deployment Models - Public, Private, Hybrid and Community Cloud	1
2.7	Infrastructure as a Service (IaaS)	1
2.8	Resource Virtualization - Server, Storage, Network	2
3	**Platform as a Service & Software as a Service**	
3.1	Introduction to PaaS, Cloud Platform and Management	1
3.2	Software as a Service (PaaS)	1
3.3	Web Services	1
3.4	Web 2.0	1
3.5	Web OS	1
3.6	Service Management in Cloud Computing	1
3.7	Billing & Accounting	1
3.8	Comparing Scaling Hardware: Traditional vs. Cloud	1
3.9	Managing Data in Cloud	1
4	**Cloud Security and Storage**	
4.1	Infrastructure Security	1

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.2	Data security and Storage	1
4.3	Data privacy and security Issues	1
4.4	Identity & Access Management	1
4.5	Authentication in cloud computing	1
4.6	Client access in cloud	1
4.7	Cloud contracting Model	1
4.8	Commercial and business considerations	1
4.9	Cloud Storage - Cloud Array, Shared Cloud Storage.	1
5	**Cloud Simulators**	
5.1	VM Ware-Introduction	1
5.2	Creating virtual machines	1
5.3	Virtualize a physical machine	1
5.4	Create a new virtual machine on local host	1
5.5	Cloning virtual machines	1
5.6	CloudSim - Introduction to Simulator	1
5.7	Understanding CloudSim simulator	1
5.8	CloudSim Architecture	1
5.9	Working platform for CloudSim	1

Course Designer(s)

1. M. Varshana Devi – varshanadevi@ksrct.ac.in

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS 702	Deep Learning	Category	L	T	P	Credit
		PC	2	0	2	3

Objectives

- To understand the basic ideas and principles of Neural Networks
- To understand the basic concepts of Data Analysis
- To familiarize the student with the Image Processing facilities like Tensorflow and Keras
- To understand and implement Deep Learning Architectures • To analyse Different Deep Learning Models for different Applications.

Pre-requisites

 Probability, statistics, linear algebra, calculus and Machine Learning Techniques

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the building blocks of Deep learning.	Understand
CO2	Implement Feature extraction and feature learning by using TensorFlow/ Keras in Deep Learning Applications.	Apply
CO3	Design and implement image recognition and image classification using a pretrained network Learning.	Apply
CO4	Analyse deep learning models in different data related projects.	Analyse
CO5	Design and implement case studies using Convolutional Neural Networks.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	2	3	-	-	-	3	-	-	3	3	3	-
CO2	3	3	3	2	3	-	-	-	3	2	-	3	3	3	-
CO3	3	3	3	3	3	-	-	-	3	2	2	3	3	3	-
CO4	3	3	3	3	3	-	-	-	3	2	2	3	3	3	-
CO5	3	3	3	3	3	-	-	-	3	2	2	3	3	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	20	-

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Understand	10	50	10	-	-	20	30
Apply	40	50	30	50	60	40	40
Analyse	-	-	10	50	40	20	30
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS 702 – Deep Learning								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	2	0	2	60	3	50	50	100
BASICS OF NEURAL NETWORKS* Basic concept of Neurons – role of Neural Networks - Building Blocks of Neural Network - Optimizers. Activation Functions. Loss Functions. Perceptron Algorithm – Boltzmann Machine and Perceptron - Data Pre-processing for neural networks- Feature extraction and feature learning.								[6]
INTRODUCTION TO DEEP LEARNING* Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization – Dropout - Installation of TensorFlow and Keras. Overfitting and Underfitting. Hyper parameters.								[6]
CONVOLUTIONAL NEURAL NETWORKS** Role of Convolutional Networks in Machine Learning.- CNN Architectures – Concept of Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning - Image classification and recurrent nets.								[6]
MORE DEEP LEARNING ARCHITECTURES LSTM, GRU, Encoder/Decoder Architectures – Auto encoders – Compression of features using Auto encoders.- Standard- Sparse – Denoising – Contractive- Variational Auto encoders – Adversarial Generative Networks – Auto encoder and DBM - **Deep Generative models, Deep Belief Networks**.**								[6]
APPLICATIONS OF DEEP LEARNING** Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.								[6]
Practical: 1. Implement Simple Programs like vector addition in TensorFlow. 2. Implement a simple problem like regression model in Keras. 3. Implement a Feed-Forward Network in TensorFlow/Keras. 4. Implement Feature Selection from Video and Image Data 5. Implement an Image Classifier using CNN in TensorFlow/Keras. 6. Implement a Simple LSTM using TensorFlow/Keras.								[30]
Total Hours: (Lecture - 30; Practical - 30)								**60**
Text Book(s):								

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.	Ian Good Fellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2017.
2.	Francois Chollet, “Deep Learning with Python”, Manning Publications, 2018.
Reference(s):	
1.	Phil Kim, “Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence”, Apress , 2017.
2.	Deep Learning A Practitioner’s Approach Josh Patterson and Adam Gibson O’Reilly Media, Inc. 2017
3.	Navin Kumar Manaswi, “Deep Learning with Applications Using Python”, Apress, 2018.
4.	Joshua F. Wiley, “R Deep Learning Essentials”, Packt Publications, 2016.

*SDG 4 – Quality Education **SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**BASICS OF NEURAL NETWORKS**	
1.1	Basic concept of Neurons - Building Blocks of Neural Network	1
1.2	Optimizers	1
1.3	Activation Functions , Loss Functions.	1
1.4	Perceptron Algorithm - Boltzmann Machine and Perceptron	2
1.5	Data Pre-processing for neural networks - Feature extraction and feature learning	1
2	**INTRODUCTION TO DEEP LEARNING**	
2.1	Feed Forward Neural Networks - Gradient Descent	1
2.2	Back Propagation Algorithm - Vanishing Gradient problem – Mitigation	1
2.3	RelU Heuristics for Avoiding Bad Local Minima	1
2.4	Gradient Descent – Regularization – Dropout	1
2.5	Installation of TensorFlow and Keras.	1
2.6	Overfitting and Underfitting. Hyperparameters.	1
3	**CONVOLUTIONAL NEURAL NETWORKS**	
3.1	Role of Convolutional Networks in Machine Learning	1
3.2	CNN Architectures - Concept of Convolution	1
3.3	Pooling Layers - Transfer Learning	1
3.4	Image Classification using Transfer Learning	1
3.5	Image classification and recurrent nets	1
3.6	Image and video recognition	1
4	**MORE DEEP LEARNING ARCHITECTURES**	
4.1	LSTM - GRU	1
4.2	Encoder/Decoder Architectures, Auto encoders	1
4.3	Compression of features using Auto encoders	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.4	Standard- Sparse – Denoising - Contractive- Variational Auto encoders	1
4.5	Adversarial Generative Networks	1
4.6	Deep generative models, Deep Belief Networks	1
5	**APPLICATIONS OF DEEP LEARNING**	
5.1	Image Segmentation – Object Detection - Automatic Image Captioning	1
5.2	Image generation with Generative Adversarial Networks	1
5.3	Video to Text with LSTM Models - Attention Models for Computer Vision	1
5.4	Case Study: Named Entity Recognition - Opinion Mining using Recurrent Neural Networks	1
5.5	Parsing and Sentiment Analysis using Recursive Neural Networks	1
5.6	Sentence Classification using Convolutional Neural Networks - Dialogue Generation with LSTMs	1

Practical:

1.	Implement Simple Programs like vector addition in TensorFlow	5
2.	Implement a simple problem like regression model in Keras	5
3.	Implement a Feed-Forward Network in TensorFlow/Keras	5
4.	Implement Feature Selection from Video and Image Data	5
5.	Implement an Image Classifier using CNN in TensorFlow/Keras	5
6.	Implement a Simple LSTM using TensorFlow/Keras	5

Course Designer(s)

1. Dr. P.KALADEVI - kaladevi@ksrct.ac.in

60 CS 703	Software Testing	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To explain the basics of software testing
- To highlight the strategies for software testing
- To stress the need and conduct of testing levels. To identify the issues in testing management
- To bring out the ways and means of controlling and monitoring testing activity
- To study about Automation testing and tools

Pre-requisites

- Software Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Interpret the basic concepts of Software testing, defects, verification and validation	Understand
CO2	Analyse the functional requirements of the system and the use of conducting the review	Analyse
CO3	Infer the need of testing techniques for White box, Basis path, Black box and Control structure testing	Analyse

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO4	Analyse the different levels of testing and their importance	Analyse
CO5	Develop your knowledge of automation testing tools and put the guidelines into practice to create test cases	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	-	-	-	-	3	-	2	-	-	3	2	-
CO2	3	3	3	-	-	-	2	-	-	-	-	-	3	2	-
CO3	3	2	2	-	3	-	-	-	-	-	-	3	3	2	-
CO4	3	3	-	3	3	-	-	2	-	-	-	-	3	2	-
CO5	3	3	3	-	3	-	-	-	-	-	-	3	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	20	20	40
Analyse	20	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS 703 – Software Testing

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction to Testing* Software Testing – Definition of Software Testing – Objective and Limits of Testing – Principles of Software Testing - Software Testing Life Cycle- Testing Strategy – Roles and Responsibilities of a Software Tester in Organizations –Origins of Defects – Cost of Defects – Independent Verification and Validation. **Hands - on:** **Introduction to Testing - Crafting Test Plans and Cases** (to create comprehensive test plans and detailed test cases)	[8]

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Software testing Requirements* Software Testing Requirements - Analyzing the requirements - Classifying the Functional and Non-Functional Requirements with their types. Software Testing Review Process - Objective of Software Testing Review - Types of Reviews - Peer Review, Walkthrough, Inspection - Checklists of Review Process - Review Log. **Hands - on:** **Software testing Requirements –** Requirement Identification(Using the requirements identified in the previous exercise, groups perform an analysis)	[9]
Testing Techniques* White Box Testing Techniques – Static and Dynamic Testing – Statement Coverage – Decision Coverage – Basic Path Testing – Control Flow Graph Coverage – Branch Coverage – Conditional Coverage – McCabe's Cyclomatic Complexity – Mutation Testing. Black Box Test Techniques – Boundary Value Analysis – Equivalent Class Partition– Error Guessing – Decision Table – State Transition Table – Pair Wise Testing – Use Case Testing. **Hands – on:** **Testing Techniques - Group Discussion and Q&A** (Groups discuss their experiences with different testing techniques, Share challenges and best practices)	[9]
Testing Types* Unit Testing – Smoke Testing – Functional Testing and its Types – Integration, System Testing, User Acceptance Testing (Alpha and Beta)- Non- F unc t io na l Testing and its Types – Performance Testing (Load, Volume and Stress)-Recovery Testing, Browser Compatibility Testing – Security Testing – Scalability Testing – Usability Testing – Ad Hoc Testing – Internationalization Testing – Configuration Testing - Data warehouse Testing and Business Intelligence Testing **–** Mobile Testing. **Hands – on:**	[8]
Testing Types - Role play (Unit Testing Scenario Vs Integration Testing Scenario)	
Automation Tools and Test Cases** Software Test Automation – Scope of Automation - Design and Architecture for Automation – Automation Testing using Selenium Tool –JUnit Test Framework - Definition of Test Case – Standard, Guidelines and Naming Conventions for Test Case Design – Characteristics of Good Test Cases and its templates – Creation of Test Case Requirement Coverage – Traceability Matrix – Test Case Review Process – Test Execution – Test Log– Reporting of Test Execution – Risk Based Testing Approach. Test metrics and measurements. **Hands – on:** **Automation Tools and Test Cases – Flipped Class (**Mobile Testing with Appium)	[10]
Total Hours:	**45**

Text Book(s):	
1.	Dorothy Graham, Rex Black, Erik van Veenendaal, "Foundations of Software Testing: ISTQB Certification", October 2020.
2.	Eran Kinsbruner, "Continuous Testing for DevOps Professionals: A Practical Guide From Industry Experts", 5 September 2018
Reference(s):	
1.	S. Subashni, N. Sathees Kumar, Dr.B.G. Geetha, Dr.G.Singaravel, "Software Testing", Umayam Publications , 1st edition ,2013.

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	Narayanan Palani, “Automated Software Testing with Cypress Hardcover – Import”, 20 April 2021.
3.	Scottie Crump, “Simplify Testing with React Testing Library Paperback – Import”, 14 May 2021.
4.	Gayathri Mohan, “Full Stack Testing: A Practical Guide for Delivering High Quality Software”, Grayscale Indian Edition,14 June 2022.
5.	https://onlinecourses.nptel.ac.in/noc17cs32/preview
6.	https://www.coursera.org/learn/ruanjian-ceshi
7.	https://www.coursera.org/learn/software-processes

*SDG 9 – Industry Innovation and Infrastructure **SDG 8 – Sustainable Economic growth

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Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Introduction to Testing**	
1.1	Software Testing	1
1.2	Definition of Software Testing	1
1.3	Objective and Limits of Testing	1
1.4	Principles of Software Testing	1
1.5	Software Testing Life Cycle	1
1.6	Testing Strategy	1
1.7	Roles and Responsibilities of a Software Tester in Organizations	1
1.8	Origins of Defects – Cost of Defects	1
1.9	Independent Verification and Validation.	1
2.0	**Software testing Requirements**	
2.1	Software Testing Requirements	1
2.2	Analyzing the requirements	1
2.3	Classifying the Functional and Non-Functional Requirements with their types	1
2.4	Software Testing Review Process	1
2.5	Objective of Software Testing Review	1
2.6	Types of Reviews - Peer Review – Walkthrough - Inspection	2
2.7	Checklists of Review Process, Review Log	2
3.0	**Testing Techniques**	
3.1	White Box Testing Techniques - Static and Dynamic Testing	1
3.2	Statement Coverage ,Decision Coverage	1
3.3	Basic Path Testing,Control Flow Graph Coverage	1
3.4	Branch Coverage,Conditional Coverage	1
3.5	McCabe’s Cyclomatic Complexity,Mutation Testing	1
3.6	Black Box Test Techniques ,Boundary Value Analysis	1
3.7	Equivalent Class Partition,Error Guessing	1
3.8	Decision Table , State Transition Table	1
3.9	Pair Wise Testing ,Use Case Testing	1
4.0	**Testing Types**	
4.1	Unit Testing,Smoke Testing	1

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.2	Functional Testing and its Types – Integration	1
4.3	System Testing, User Acceptance Testing (Alpha and Beta)	1
4.4	Non-Functional Testing and its Types – Performance Testing (Load, Volume and Stress)	1
4.5	Recovery Testing, Browser Compatibility Testing	1
4.6	Security Testing ,Scalability Testing, Usability Testing, Ad Hoc Testing	1
4.7	Internationalization Testing – Configuration Testing	1
4.8	Data warehouse Testing and Business Intelligence Testing – Mobile Testing.	1
5.0	**Automation Tools and Test Cases**	
5.1	Software Test Automation ,Scope of Automation	1
5.2	Design and Architecture for Automation, Automation Testing using Selenium Tool	1
5.3	JUnit Test Framework, Definition of Test Case	1
5.4	Characteristics of Good Test Cases and its templates	1
5.5	Creation of Test Case Requirement Coverage	1
5.6	Traceability Matrix Test Case Review Process	1
5.7	Guidelines and Naming Conventions for Test Case Design ,Test Execution	1
5.8	Reporting of Test Execution	1
5.9	Risk Based Testing Approach	1
5.10	Test metrics and measurements	1

Course Designer(s)

1. Mrs.R.Kabila - kabila@ksrct.ac.in

60 AC 001	Research Skill Development	Category	L	T	P	Credit
		AC	1	0	0	0

Objectives

- To identify research problems, formulate hypotheses, collect data and test hypotheses
- To prepare and submit quality manuscripts and understand peer review process
- To utilize software tools for effective manuscript preparation and visualization of research data
- To familiarize different journal metrics and author-level quality indicators To protect creative works, inventions, and branding elements using IPR

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Develop structured scientific approach to plan and execute research work	Apply

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO2	Understand the journal requirements to publish research findings effectively	Understand
CO3	Apply various software tools during the manuscript preparation	Apply
CO4	Select suitable journals to publish the work using different publication metrics	Analyse
CO5	Apply the appropriate form of IP protection to a specific invention or creation	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	2		2	2	3	3	3		3	3	3	
CO2								3	3	3		3	3	3	
CO3					3			3	3	3		3	3	3	
CO4								3	3			3	3	3	
CO5			2	2				3	3	3		3	3	3	

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

One review at end of the semester

Parameters	Weightage (Marks)
Research Problem Identification (Research gap, SDG, Objectives)	10
Literature Review preparation (Clarity, Number and quality of sources)	20
Patent Draft/ Manuscript Preparation (Structure, Content)	20
Use of software tools (Plagiarism, Reference Management, etc.,)	10
Journal Identification (Aim & scope of the journal, journal metrics)	10
Presentation & Viva voce	30
Total	**100**

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
60 AC 001 – Research Skill Development							
Semester	Hours/Week			Total Hours	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
VII	1	0	0	15	0	100	-	100

Research - Scientific Approach*

Types of Research - Identification and Clarification of the problem – Problem analysis - Formulating hypothesis, Selection of sample and tools of data collection - Testing the hypothesis - Conclusion [3]

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Manuscript Preparation* Structure of a manuscript - Types of manuscript - Graphical abstract - Highlights - Literature Review - Citation - Reference style - Plagiarism – Journal selection - Peer review process	[3]
Research Toolkit* Software Tools for Writing enhancement - Literature review - Reference management - Data analysis and visualization - Drawing - Plagiarism	[3]
Research Publication Metrics* Journal Index: Scopus - Web of Science - SCI - UGC Care - Q Journal; Journal Metrics: Impact Factor, Cite Score; Quality Indicators: h-index - i-10 index - citations	[3]
Intellectual Property Rights* Patents - Industrial Designs - Copyright - Trademarks - Geographical Indications - Trade Secrets	[3]
Total Hours:	**15**

Reference(s):

1.	Kothari, C.R. and Gaurav Garg, “Research Methodology: Methods and Techniques”, New Age International Publishers, 2023
2.	Chawla H S., “Introduction to Intellectual Property Rights”, CBS Publishers and Distributors Private Limited, 2019

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Research - Scientific Approach**	
1.1	Types of Research - Identification and Clarification of the problem – Problem analysis - Formulating hypothesis	2
1.2	Selection of sample and tools of data collection - Testing the hypothesis - Conclusion	1
2	**Manuscript Preparation**	
2.1	Structure of a manuscript - Types of manuscript - Graphical abstract - Highlights	1
2.2	Literature Review	1
2.3	Citation - Reference style – Plagiarism, Journal selection - Peer review process	1
3	**Research Toolkit**	
3.1	Software Tools for Writing enhancement	1
3.2	Literature review, Reference management	1
3.3	Data analysis and visualization – Drawing, Plagiarism	1

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Passed in BoS Meeting held on 24/05/2024
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CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4	**Research Publication Metrics**	
4.1	Journal Index: Scopus - Web of Science - SCI - UGC Care - Q Journal;	1
4.2	Journal Metrics: Impact Factor, Cite	1
4.3	ScoreQuality Indicators: h-index - i-10 index - citations	1
5	**Intellectual Property Rights**	
5.1	Patents	1
5.2	Industrial Designs - Copyright	1
5.3	Trademarks - Geographical Indications - Trade Secrets	1

Course Designer

1.Dr.M.Kathirselvam - mkathirselvam@ksrct.ac.in

60 AB 001	National Cadet Corps - Air Wing	Category	L	T	P	Credit
		HS	2	0	2	3

Objectives

- To designed especially for NCC Cadets to educate basic military knowledge
- To develop character, camaraderie, discipline, secular outlook
- To inculcate spirit of adventure, sportsman spirit
- To teach selfless service amongst cadets by working in teams
- To learn military subjects including weapon training and motivate them to join in triservices

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Display sense of patriotism, secular values and shall be transformed into motivated youth who will carry out nation building through national unity and social cohesion.	Remember
CO2	Demonstrate the sense of discipline with smartness and have basic knowledge of weapons and their use and handling.	Remember
CO3	Illustrate various forces and moments acting on aircraft.	Understand
CO4	Outline the concepts of aircraft engine and rocket propulsion	Understand
CO5	Design, build and fly chuck gliders/model airplanes and display static models	Create

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	3	3	3	3	3	-	-	-	-	-
CO2	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-

3 - Strong; 2 - Medium; 1 - Some

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

60 AB 001 – National Cadet Corps (Air Wing)

Common to all Branches

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	2	0	2	60	3	50	50	100

NCC Organization & National Integration * NCC Organization – History of NCC- NCC Organization- NCC Training- NCC Uniform – Promotion of NCC cadets – Aim and advantages of NCC Training- NCC badges of Rank- Honors' and Awards – Incentives for NCC cadets by central and state govt. History and Organization of IAF – Indo-PakWar-1971 – Operation Safed Sagar - National Integration - Unity in diversity- Contribution of Youth in Nation Building- National Integration Council- Images and Slogans on National Integration.	[12]
Drill and Weapon Training* Basic Physical Training – Various Exercises for Fitness (with Demonstration) – Food – Hygiene and Cleanliness. Drill – Words of Commands- Position and Commands– Sizing and Forming – Saluting – Marching – Turning on the march and wheeling – Saluting on the march – Sidepace, Pace forward and to the rear – Marking time – Drill with arms – Ceremonial drill – Guard mounting.(WITH DEMONSTRATION)	[12]
Principles of Flight* **L**aws of Motion – Forces Acting on Aircraft - Bernoulli"s Theorem - Staling – Primary control surfaces - Secondary control surfaces – Aircraft recognition.	[12]
Aero Engines* Introduction of Aero Engine – Types of Engines – Piston Engine – Jet Engines – Turboprop Engines – Basic Flight Instruments – Modern trends.	[12]
Aero Modeling* History of Aero modelling – Materials used in Aeromodeling – Types of Aeromodels – Static Models – Gliders – Control line models – Radio Control Models-Building and Flying of Aeromodels.	[12]
Total Hours	**60**
Text Book(s):	

1.	National Cadet Corps- A Concise handbook of NCC Cadets by Ramesh Publishing House, New Delhi, 2014

Reference(s):

1.	"Cadets Handbook – Common Subjects SD/SW" by DG NCC, New Delhi,2019
2.	"Cadets Handbook – Specialised Subjects SD/SW" by DG NCC, New Delhi,2017
3.	"NCCOTA Precise", published by DGNCC, NewDelhi.

*SDG 4 – Quality Education

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CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Designer(s)

1. Flt Lt V.R.SADASIVAM- sadasivam@ksrct.ac.in

60 AB 002	National Cadet Corps - Army Wing	Category	L	T	P	Credit
		HS	2	0	2	3

Objectives

- Develop character, camaraderie
- Inculcate discipline, secular outlook
- Enrich the spirit of adventure, sportsman spirit
- Ideals of selfless service amongst cadets by working in teams
- Improve qualities such as self-discipline, self-confidence, selfcadets

nce and labour in the

Pre-requisites

 NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Display sense of patriotism, secular values and shall be transformed into motivated youth who will carry out nation building through national unity and social cohesion.	Understand
CO2	Demonstrate Health Exercises, the sense of discipline, improve bearing, smartness, turn out, develop the quality of immediate and implicit obedience of orders.	Apply
CO3	Basic knowledge of weapons and their use and handling.	Understand
CO4	Aware about social evils and shall inculcate sense of whistle blowing against such evils and ways to eradicate such evils	Analyse
CO5	Acquaint, expose & provide knowledge about Army/Navy/ Air force and to acquire information about expansion of Armed Forces, service subjects and important battles	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
CO3	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-

3 - Strong; 2 - Medium; 1 - Some

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022
60 AB 002 – National Cadet Corps (Army Wing)

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Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Common to all Branches								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	2	0	2	60	3	50	50	100

NCC Organization & National Integration * NCC Organization – History of NCC- NCC Organization- NCC Training- NCC Uniform – Promotion of NCC cadets – Aim and advantages of NCC Training- NCC badges of Rank- Honors' and Awards – Incentives for NCC cadets by central and state govt. National Integration - Unity in diversity- contribution of youth in nation building- national integration council- Images and Slogans on National Integration	[12]
Basic Physical Training & Drill ** Basic physical Training – various exercises for fitness (with Demonstration)-Food – Hygiene and Cleanliness. Drill- Words of commands- position and commands- sizing and forming- saluting- marching- turning on the march and wheeling- saluting on the march- side pace, pace forward and to the rear- marking time- Drill with arms- ceremonial drill- guard mounting.(WITH DEMONSTRATION).	[16]
Weapon Training* Main Parts of a Rifle- Characteristics of .303 rifle- Characteristics of .22 rifle- loading and unloading – position and holding safety precautions – range procedure- MPI and Elevation- Group and Snap shooting- Long/Short range firing(WITH PRACTICE SESSION) - Characteristics of 5.56mm rifle- Characteristics of 7.62mm SLR- LMG- carbine machine gun – pistol.	[12]
Social Awareness and Community Development ** Aims of Social service-Various Means and ways of social services- family planning – HIV and AIDS- Cancer its causes and preventive measures- NGO and their activities- Drug trafficking- Rural development programmes - MGNREGA- SGSYJGSYNSAPPMGSY-Terrorism and counter terrorism- Corruption – female foeticide -dowry – child abuse-RTI Act- RTE Act- Protection of children from sexual offences act- civic sense and responsibility	[12]
Specialized Subject (ARMY) * Basic structure of Armed Forces- Military History – War heroes- battles of Indo-Pak warParam Vir Chakra- Career in the Defence forces- Service tests and interviews.	[8]
Total Hours	**60**

Text Book(s):	
1.	National Cadet Corps- A Concise handbook of NCC Cadets by Ramesh Publishing House, New Delhi, 2014
2.	Cadets Handbook- Specialized Subjects SD/SW published by DG NCC, New Delhi ,2014
Reference(s):	
1.	"Cadets Handbook – Common Subjects SD/SW" by DG NCC, New Delhi,2019
2.	"Cadets Handbook – Specialised Subjects SD/SW" by DG NCC, New Delhi,2017

*SDG 4 – Quality Education

**SDG 3 – Good Health and Well Being

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**NCC Organization & National Integration**	
1.1	NCC Organization	1
1.2	History of NCC and NCC Organization	1

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.3	NCC Training and NCC Uniform	1
1.4	Promotion of NCC cadet, Aim and advantages of NCC Training	1
1.5	NCC badges of Rank, Honors' and Awards, Incentives for NCC cadets by central and state govt	2
1.6	National Integration, Unity in diversity	1
1.7	Contribution of youth in nation building	2
1.8	National integration council	1
1.9	Images and Slogans on National Integration	2
2	**Basic Physical Training & Drill**	
2.1	Basic physical Training – various exercises for fitness (with Demonstration)-	3
2.2	Food – Hygiene and Cleanliness .	1
2.3	Drill- Words of commands- position and commands- sizing and forming-	3
2.4	saluting- marching- turning on the march and wheeling-	3
2.5	saluting on the march- side pace, pace forward and to the rear- marking time-	3
2.6	Drill with arms- ceremonial drill- guard mounting.(WITH DEMONSTRATION)	3
3	**Weapon Training Main Parts of a Rifle**	
3.1	Characteristics of .303 rifle	1
3.2	Characteristics of .22 rifle	2
3.3	Loading and unloading, position and holding safety precautions	2
3.4	Range procedure, MPI and Elevation-	2
3.5	Group and Snap shooting Long/Short range firing (WITH PRACTICE SESSION)	3
3.6	Characteristics of 5.56 mm rifle	1
3.7	Characteristics of 7.62mm	1
4	**Social Awareness and Community Development**	
4.1	Aims of Social service, Various Means and ways of social services	1
4.2	Family planning , HIV and AIDS	1
4.3	Cancer its causes and preventive measures	1
4.4	NGO and their activities, Drug trafficking	1
4.5	Rural development programmes	1
4.6	MGNREGA, SGSY, JGSY, NSAP, PMGSY	2
4.7	Terrorism and counter terrorism, Corruption	1
4.8	female foeticide, dowry, child abuse	1
4.9	RTI Act, RTE Act	1
4.10	Protection of children from sexual offences act	1
4.11	Civic sense and responsibility	1
5	**Specialized Subject (ARMY)**	
5.1	Basic structure of Armed Forces	1
5.2	Military History, War heroes	1
5.3	battles of Indo - Pak war	1
5.4	Param Vir Chakra	1
5.5	Career in the Defence forces	2
5.6	Service tests and interviews.	2

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Tiruchengode - 637 215, Namakkal-Dt.

Course Designer(s)

1. CT E CHANDRA KUMAR - chandrakumar@ksrct.ac.in

60 CS 7P1	Cloud Computing Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- Be exposed to tool kits for grid and cloud environment
- Be familiar with developing web services/Applications in grid framework
- Learn to run virtual machines of different configuration
- Capability to develop cloud architecture and model
- Learn to configure and use Hadoop

Pre-requisites

Computer Networks, Operating Systems

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Ability to use the relevant tools necessary for cloud computing.	Apply
CO2	Demonstrate the use of cloud computing in various applications	Apply
CO3	Apply different cloud programming model as per need.	Apply
CO4	Ability to develop cloud architecture and model.	Apply
CO5	Analyze and implement the best practice model to deploy cloud architecture and configure Hadoop file system and framework in multi node cluster	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	3	-	-	-	-	2	-	-	3	-	-
CO2	3	2	3	-	3	2	-	-	-	2	-	2	3	-	-
CO3	3	2	3	-	3	2	-	2	3	2	-	-	3	-	-
CO4	3	3	3	-	3	2	-	2	-	2	3	-	3	-	-
CO5	3	3	2	-	3	-	2	2	3	2	3	2	3	3	-

3 - Strong; 2 - Medium; 1 - Some

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	35	12	75	75
Analyse	15	13	25	25
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS 7P1 – Cloud Computing Laboratory

Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	0	0	4	60	2	60	40	100

List of Experiments: *

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time in host machine. (Virtual Box or VM Ware or Hyper-V)
2. Install a C compiler in the virtual machine and execute a sample program
3. Develop a web application to provide Storage as a Service that offers a simple interface which allows users to manage file systems quickly and easily
4. Configure IaaS architecture for installing guest operating system using Eucalyptus
5. Configure IaaS architecture in Eucalyptus for installing multiple operating systems in same host machine by sharing different core in the same processor
6. To set up the single and multi node Hadoop cluster in guest operating systems. Demonstrate the use of Map and Reduce tasks using word count program
7. Set up a Hadoop cluster on the chosen cloud platform.
8. Upload a large dataset to the Hadoop Distributed File System (HDFS).

*SDG 9 – Industry Innovation and Infrastructure

Course Designer(s)

1. M. Varshana Devi – varshanadevi@ksrct.ac.in

60 CS 7P2	Project Work Phase - I	Category	L	T	P	Credit
		CG	0	0	4	2

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CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Objectives

To Imparting the practical knowledge to the students and also to make them to carry out the technical procedures in their project work. To provide an exposure to the students to refer, read and review the research articles, journals and conference proceedings relevant to their project work and placing this as their beginning stage for their final presentation

Pre-requisites

All Courses

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify a problem in the domain of interest	Apply
CO2	Perform literature survey and identify the existing issues	Apply
CO3	Identify the possible solutions	Apply
CO4	Identify tools and techniques to implement the project	Apply
CO5	Prepare technical report	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Internal Assessment: 100 Marks

Review I (R1)			Review II (R2)		Review III (R3)			Total (R1+R2 +R3)	Internal
Literature Survey	Topic Identification & Justification	Work Plan	Approach	Conclusion	Demo-Existing System	Presentation	Report	Total	
10	10	10	20	20	10	10	10	100	100

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 CS 7P2 – Project Work Phase - I							
Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
					C	CA	ES	Total
	L	T	P					

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Passed in BoS Meeting held on 24/05/2024

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

VII	0	0	4	60	2	100	00	100

1. Three reviews have to be conducted by the committee of minimum of three members one of which should be the guide
2. Problem should be selected
3. Students have to collect about 20 papers related to their work
4. Reports has to be prepared by the students as per the format in Annexure – 1
5. Preliminary implementation can be done if possible Internal evaluation has to be done for 100 Marks

K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215
(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS
(For the candidates admitted in 2024-2025)

EIGTH SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	
				Continuous Assessment *	End Semester Exam **	Max. Marks	End Semester Exam	Total
THEORY								
1	60 CS E5*	Professional Elective - V	2	40	60	100	45	100
PRACTICAL								
2	60 CS 8P1	Project Work Phase - II	3	60	40	100	45	100
3	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

**End semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination and 40 marks for project End Semester Examination.

60 CS 8P1	Project Work Phase - II	Category	L	T	P	Credit
		CG	0	0	16	8

Objectives

- Enabling and strengthening the students to carry out the project on their own and to implement their innovative ideas to forefront the risk issues and to retrieve the hazards by adopting suitable assessment methodologies and stating it to global

Pre-requisites

All Courses

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Design modules of the project	Analyse
CO2	Integrate the modules and arrive the final output	Apply
CO3	Investigate the results with available solutions	Apply
CO4	Demonstrate the outcome of the project and verify.	Apply
CO5	Prepare technical report	Evaluate

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Internal Assessment: 60 Marks + End Semester Examination: 40 Marks

Internal Assessment (60)					End Semester (40)
Items	Review 1	Review 2	Review 3	Publication*	
Marks	5	10	15	30	40
	Total internal marks 60				

K.S.Rangasamy College of Technology – Autonomous R2022
B.E – Computer Science and Engineering
60 CS 8P1 – Project Work Phase - II

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Semester	Hours/Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	0	0	16	240	8	60	40	100

1. Three reviews have to be conducted by the committee of minimum of three members one of which should be the guide
2. Each review has to be evaluated for 100 Marks
3. Attendance is compulsory for all reviews. If a student fails to attend review for some valid reason, one or more chance may be given
4. They should publish the paper preferably in the journals / conference
5. Final review will be done by the committee that consists of minimum of three members one of which should be the guide (If possible include one external expert examiner with in the college) The Report should be submitted by the students around at the end of April.

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS E11	Data Mining	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To introduce basic concepts, tasks, methods, and techniques in data mining.
- To emphasis is on various data mining problems and their solutions.
- To understand the data mining process and issues, learn various data mining techniques
- To apply the techniques in solving data mining problems using data mining tools and systems
- To apply the clustering analysis and statistical approach

Pre-requisites

- Basic understanding of Linear Algebra, Statistics and programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic concept and issues of data mining	Understand
CO2	Develop data warehouse and OLAP technology for data mining	Apply
CO3	Interpret the steps of data preprocessing and multidimensional association rules	Apply
CO4	Implement different classification techniques and association rule mining and its applications	Apply
CO5	Apply different clustering techniques and outlier analysis in real time applications	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	2	2	3	-
CO2	3	3	3	-	2	2	-	-	2	-	-	2	2	3	-
CO3	3	3	3	-	2	-	-	-	2	-	-	2	2	3	-
CO4	3	3	3	-	2	2	-	-	3	-	-	2	2	3	-
CO5	3	3	3	-	2	2	-	-	3	-	-	2	2	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	20	-
Understand	20	-	20	-	-	30	-
Apply	30	100	30	100	100	50	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E11 – Data Mining								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	2	0	2	60	3	50	50	100

Introduction to Data Mining* Motivation and importance - What is Data Mining - Relational Databases - Data Warehouses - Transactional Databases -Advanced Database Systems - Data Mining Functionalities - Major issues in Data Mining.	[6]
Data Warehouse and OLAP Technology for Data Mining* What is a Data Warehouse - Multi-Dimensional Data Model - Data Warehouse Architecture – Data Warehouse Implementation - Development of Data Cube Technology - Data Warehousing to Data Mining.	[6]
Data Preprocessing and Data Mining Techniques* Data Preprocessing - Data Integration and Transformation - Data Reduction - Data Mining Primitives: Mining Association rule in large Databases - Association Rule Mining - Mining Single-dimensional Boolean Association rules from Transactional Databases - Mining Multi-dimensional Association rules from relational databases & Data Warehouses.	[6]
Classification and Prediction** Concepts and Issues regarding Classification and Prediction - Classification by Decision Tree Induction – Bayesian Classification - Classification by SVM - Classification by Random Forest - Classification by K nearest.	[6]
Cluster Analysis** What is Cluster Analysis? - Types of Data in Cluster Analysis - A Categorization of Major clustering methods – partitioning methods - Hierarchial methods - Density-Based Methods: DBSCAN - Outlier analysis.	[6]

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Practical: 1. Implementation of exploratory data analysis 2. Implementation of preprocessing phase 3. Implementation of feature selection techniques 4. Implementation of Association rule mining 5. Implementation of Decision Tree Induction classification algorithm 6. Implementation of Bayesian Classification algorithm 7. Implementation of classification by SVM 8. Implementation of K nearest neighbor algorithm 9. Implementation of k-means clustering algorithm 10. Mini Project	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, 4th Edition, Morgan Kaufman Publications, 2022.
2.	Pang-Ning Tan et.,” Introduction to Data Mining”, first edition,2006.
Reference(s):	
1.	Adriaan, “Introduction to Data Mining”, Addison Wesley Publication
2.	Pujari A K, “Data Mining Techniques”, University Press.
3.	Mohammed J. Zaki and Wagner Meira, Jr, “Data Mining and Machine Learning: Fundamental Concepts and Algorithms”, Cambridge University Press, March 2020.
4.	Gordon S. Linoff, Michael J. A. Berry, “Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management”, Wiley publisher, third edition,2008

*SDG 9 – Industry Innovation and Infrastructure **SDG 4 – Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction to Data Mining**	
1.1	Motivation and importance - What is Data Mining	1
1.2	Relational Databases	1
1.3	Data Warehouses	1
1.4	Transactional Databases	1
1.5	Advanced Database Systems	1
1.6	Data Mining Functionalities - Major issues in Data Mining	1
2	**Data Warehouse and OLAP Technology for Data Mining**	
2.1	What is a Data Warehouse	1
2.2	Multi-Dimensional Data Model	1
2.3	Data Warehouse Architecture	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.4	Data Warehouse Implementation	1
2.5	Development of Data Cube Technology	1
2.6	Data Warehousing to Data Mining	1
3	**Data Preprocessing and Data Mining Techniques**	
3.1	Data Preprocessing: Data Integration and Transformation	1
3.2	Data Reduction	1
3.3	Data Mining Primitives: Mining Association rule in large Databases	1
3.4	Association Rule Mining	1
3.5	Mining Single-dimensional Boolean Association rules from Transactional Databases	1
3.6	Mining Multi-dimensional Association rules from relational databases & Data Warehouses	1
4	**Classification and Prediction**	
4.1	Concepts and Issues regarding Classification and Prediction	1
4.2	Classification by Decision Tree Induction	1
4.3	Bayesian Classification	1
4.4	Classification by SVM	1
4.5	Classification by Random Forest	1
4.6	Classification by K nearest neighbor	1
5	**Cluster Analysis**	
5.1	What is Cluster Analysis? Types of Data in Cluster Analysis	1
5.2	A Categorization of Major clustering methods	1
5.3	Partitioning methods	1
5.4	Hierarchial methods	1
5.5	Density-Based Methods: DBSCAN	1
5.6	Outlier analysis	1
Practical:		
1.	Implementation of exploratory data analysis	3
2.	Implementation of preprocessing phase	3
3.	Implementation of feature selection techniques	3
4.	Implementation of Association rule mining	3
5.	Implementation of Decision Tree Induction classification algorithm	3
6.	Implementation of Bayesian Classification algorithm	3
7.	Implementation of classification by SVM	3
8.	Implementation of K nearest neighbor algorithm	3
9.	Implementation of k-means clustering algorithm	3
10.	Mini Project	3

Course Designer(s)

1. Ms. T. Subalaxmi -subalakxmi@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS E12	Node.js and React.js	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To learn the runtime web development for easily building fast and scalable network applications.
- To enhance the knowledge in event-driven and real-time applications that run across distributed devices.
- To learn the streams and file systems in Node Js
- To acquire the knowledge on web development and database connectivity
- To Acquire the knowledge of MVC template on user interfaces using React JS

Pre-requisites

- HTML, CSS, JavaScript

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the fundamental structure of Node.js platform	Understand
CO2	Experiment the concepts of NPM	Apply
CO3	Develop database connectivity using node.js	Apply
CO4	Interpret the concepts of React.js	Understand
CO5	Analyse the features of React.js	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	2	-	3	-	-	2	3	2	-	3	2	2	-
CO2	2	3	2	-	3	-	-	2	3	2	-	3	2	2	-
CO3	2	3	2	2	3	-	-	2	3	2	-	3	2	2	-
CO4	2	3	2	2	3	-	-	2	3	2	-	3	2	2	-
CO5	2	3	2	-	3	-	-	2	3	2	-	3	2	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	10	-
Understand	20	-	20	-	-	30	-
Apply	30	100	30	100	100	50	100
Analyse	-	-	-	-	-	10	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E12 – Node.js and React.js								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	2	0	2	60	3	50	50	100

Introduction to Node.js* The environment of Node.js - Benefits and Features - Install Node.js on Windows - Console and Web programs - Node.js REPL Commands	[6]
NPM* Node.js Package Manager - Installing modules using NPM - Node.js Command Line Options - Node.js File- Node.js DNS - Node.js Net	[6]
Web Development** Node.js Web Module - Node.js html form handling - Node.js Database Connectivity	[6]
Introduction to React.js The environment of React.js - Benefits and Features – components – state – lifecycle – events – forms – CSS	[6]
React.js The React ES6 – React Render HTML - React JSX – React class – React Lists – React Router	[6]
Practical: 1. Create a server program using node.js and display the content in browser 2. Execute Read,Evaluate,Print and Loop(REPL) commands in node.js terminal window. 3. Demonstrate the installation of packages using NPM 4. Develop a node.js server program to implement file upload 5. Design student registration form using html and call the file using node.js which will display output in browser. 6. Demonstrate node.js database connectivity. 7. Create a React Js program to style the html component. 8. Demonstrate React JS various Events. 9. Create a react program to implement JSX(JavaScript XML). 10. Mini Project - Create a web application using react components and implement Node JS database connectivity	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**
Text Book(s):	

1.	Azat Mardan, “Practical Node.Js Building Real - World Scalable Web Apps”, APRESS Publication, 2018.
2.	Sandro Pasquali, Kevin Faaborg, “Mastering Node.js”, Packt Publishing Limited, 2nd Edition, 2017.

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Reference(s):	
1.	Alex Young, Bradley Meck, Mike Cantelon, “Node.js in Action”, Manning Publications, 2017.
2.	Alex banks & Eve Porcello, “Learning React”, O’Reilly Publications, 2017
3.	https://www.w3schools.com/REACT/default.asp
4.	https://www.tutorialspoint.com/nodejs/nodejs_introduction.html

*SDG 4 – Quality Education

**SDG 8 – Productive employment and decent work for all

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction to Node.js**	
1.1	The environment of Node.js	1
1.2	Benefits and Features	1
1.3	Install Node.js on Windows	1
1.4	Console programs - Web programs	2
1.5	Node.js REPL Commands	1
2	**NPM**	
2.1	Node.js Package Manager	1
2.2	Installing modules using NPM	1
2.3	Node.js Command Line Options	1
2.4	Node.js File	1
2.5	Node.js DNS	1
2.6	Node.js Net	1
3	**Web Development**	
3.1	Node.js Web Module	2
3.2	Node.js html form handling	2
3.3	Node.js Database Connectivity	2
4	**Introduction to React.js**	
4.1	The environment of React.js	1
4.2	Components - State	2
4.3	Lifecycle	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.4	Events	1
4.5	Forms	1
5	**React JS**	
5.1	The React ES6	1
5.2	React Render HTML	1
5.3	React JSX	1
5.4	React class	1
5.5	React Lists - React Router	2
Practical:		
1.	Create a server program using node.js and display the content in browser	3
2.	Execute Read,Evaluate,Print and Loop(REPL) commands in node.js terminal window.	3

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.	Demonstrate the installation of packages using NPM	3
4.	Develop a node.js server program to implement file upload	3
5.	Design student registration form using html and call the file using node.js which will display output in browser.	3
6.	Demonstrate node.js database connectivity.	3
7.	Create a React Js program to style the html component.	3
8.	Demonstrate React JS various Events.	3
9.	Create a react program to implement JSX(JavaScript XML).	3
10.	Mini Project Create a web application using react components and implement Node JS database connectivity	3

Course Designer(s)

1. S Vadivel - vadivels@ksrct.ac.in

60 CS E13	Mobile Application Development	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To impart knowledge in Android Application Development
- To understand the app idea and design user interface/wireframes of mobile app and set up the mobile app development environment
- To develop and debug mobile app components –User interface, services, notifications, broadcast receivers, data components
- To use emulator to deploy and run mobile app
- To perform mobile app -unit testing and black box testing

Pre-requisites

- Java Programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the Mobility landscape and platforms	Understand
CO2	Demonstrate the interactive and feature-rich Android applications to address real-world challenges	Apply
CO3	Develop Android apps using native data handling, background tasks, and location awareness	Apply
CO4	Utilize graphics, animation, and multimedia to enhance the visual appeal and overall engagement of Android apps	Apply
CO5	Apply testing, signing, packaging, and distribution processes to successfully release and update Android apps	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	3	-	-	-	2	-	-	2	3	-	-

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO2	2	2	2	-	3	2	-	-	2	-	-	2	3	-	-
CO3	3	3	3	3	3	3	3	-	2	3	3	2	3	-	-
CO4	3	2	3	3	3	-	-	-	2	3	3	2	3	-	-
CO5	3	3	3	-	3	3	3	3	2	3	2	2	3	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	30	-
Understand	20	-	20	-	-	30	-
Apply	30	100	30	100	100	40	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E13 – Mobile Application Development								
Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	2	0	2	60	3	50	50	100

GETTING STARTED WITH MOBILITY* Mobility landscape, Mobile platforms, Overview of Android platform, setting up the mobile app development environment along with an emulator, a case study on Mobile app development.	[6]
BUILDING BLOCKS OF MOBILE APPS* App user interface designing – Activity-states and life cycle methods, mobile UI resources (Layout, UI elements, Draw-able, Menu), UI Elements and events, interaction amongst activities, fragments.	[6]
APP FUNCTIONALITY BEYOND USER INTERFACE Background tasks -Threads, Async task, Services, Notifications, Telephony and SMS APIs, Native data handling –on-device file I/O, shared preferences, mobile databases such as SQLite. location awareness, Location services.	[6]
VISUALS AND MULTIMEDIA INTEGRATION* Graphics and animation –custom views, canvas, animation APIs, multimedia –audio/video playback and record.	[6]
TESTING AND PUBLISHING OF MOBILE APPS* Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Versioning, signing and packaging mobile apps, distributing apps on mobile market place.	[6]

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215. Namakkal-Dt.

Practical: 1. Create a simple Android app with a simple user interface. 2. Create a mobile app with various GUI components like buttons, text fields, and labels 3. Design an application that uses Layout Managers and event listeners. 5. Create a mobile app that allows users to draw basic shapes (lines, circles, rectangles) on the screen using touch or mouse input. 6. Implement an application that uses Multi-threading. 7. Implement an application that creates an alert upon receiving a message 8. Develop an application that makes use of databases. 9. Integrate audio/video playback using Android's animation APIs. 10. Develop a mobile application to send an email. 11. Write automated test cases for a mobile app using Robotium. * Develop a Mobile application for simple needs and publish the app on a mobile marketplace (Mini Project) **Tools used: Android, Java / Flutter**	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**
Text Book(s):	
1.	Anubhav Pradhan, Anil V. Deshpande, “Composing Mobile Apps: Learn/Explore/Apply/ Using Android”, Wiley India Private Limited, 1st Edition, 2014.
2.	Dr. Madhu Goel, Chetna Sharma, ER. SHOBHIT, “Mobile Application Development”, ISHAN PUBLICATIONS,2020
Reference(s):	
1.	Frank Ableson W, Sen R ,Chrisking, “Android in Action”, Dream tech Press, New Delhi, 3rd Edition,2012.
2.	Rodger, “Beginning Mobile Application Development in The Cloud”, Wiley Publication,2011.
3.	Carmen Delessio, “Android Application Development in 24 Hours”, 4th Edition, Pearson Education.
4.	

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**GETTING STARTED WITH MOBILITY**	
1.1	Introduction to Mobility Landscape	1
1.2	Overview of Mobile Platforms	1
1.3	Overview of Android platform	1
1.4	Setting Up Mobile App Development Environment	1
1.5	Emulator Setup and Configuration	1
1.6	Case Study: Mobile App Development	1
2	**BUILDING BLOCKS OF MOBILE APPS**	
2.1	App user interface designing - Activity-states and life cycle methods	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.2	Mobile UI resources (Layout, UI elements, Draw-able, Menu)	1
2.3	UI Elements and events	1
2.4	Interaction amongst activities	1
2.5	Fragments	1
2.6	App user interface designing - Activity-states and life cycle methods	1
3	**APP FUNCTIONALITY BEYOND USER INTERFACE**	
3.1	Threads, Async task, Services	1
3.2	Notifications	1
3.3	Broadcast receivers, Telephony and SMS APIs	1
3.4	Native Data Handling: On-device File I/O, Shared preferences	1
3.5	Mobile databases such as SQLite	1
3.6	Location awareness, Location services	1
4	**VISUALS AND MULTIMEDIA INTEGRATION**	
4.1	Android Graphics	1
4.2	Custom Views and Canvas	1
4.3	Android animation, Animation APIs	1
4.4	Multimedia: Audio Playback and Record	1
4.5	Multimedia: Video Playback and Record	1
4.6	Graphics and Multimedia: Advanced Techniques	1
5	**TESTING AND PUBLISHING OF MOBILE APPS**	
5.1	Debugging Mobile Apps	1
5.2	Introduction to Testing Mobile Apps Components	1
5.3	White Box Testing, Black Box Testing	1
5.4	Test Automation of Mobile Apps ,JUnit for Android	1
5.5	Versioning, Signing, and Packaging Mobile Apps	1
5.6	Distributing Apps on Mobile Marketplaces	1
Practical:		
1.	Create a simple Android app with a simple user interface.	3
2.	Create a mobile app with various GUI components like buttons, text fields, and labels	3
3.	Design an application that uses Layout Managers and event listeners.	3
4.	Create a mobile app that allows users to draw basic shapes (lines, circles, rectangles) on the screen using touch or mouse input.	3
5.	Implement an application that uses Multi-threading.	3
6.	Implement an application that creates an alert upon receiving a message	3
7.	Develop an application that makes use of databases.	3
8.	Integrate audio/video playback using Android's animation APIs.	3
9.	Develop a mobile application to send an email.	3
10.	Write automated test cases for a mobile app using Robotium. * Develop a Mobile application for simple needs and publish the app on a mobile marketplace (Mini Project)	3

Course Designer(s)

1. Dr.P.Kaladevi -kaladevi@ksrct.ac.in

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60 CS E14	Information Retrieval Techniques	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To learn the concepts behind IR
- To understand the operation of web search
- To study the construction and working principle of transmission systems and types of tyres
- To learn the algorithms related to text classification, indexing and searching
- To learn IR and Applications

Pre-requisites

- Data Structures

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply the Knowledge on open source search engine framework and explore its capabilities	Apply
CO2	Analyze the various modeling and evaluation techniques	Analyze
CO3	Apply the represent documents in different ways and discuss its effect on similarity	Apply
CO4	Analyze the Calculations and on search	Analyze
CO5	Develop and implement an innovative feature in a search engine	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	3	-	-	-	-	-	-	-	-	-	2	-	-
CO2	1	3	-	-	-	3	-	-	-	-	3	-	2	-	-
CO3	1	-	-	3	-	-	3	-	-	2	-	1	2	-	-
CO4	1	3	2	3	-	-	-	-	3	-	-	-	2	-	-
CO5	1	3	2		-	-	-	-	-	-	3	1	2	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	20	-	10	-	-	20	-
Understand	20	-	20	-	-	30	-
Apply	10	50	10	50	50	30	50
Analyse	10	50	20	50	50	20	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-

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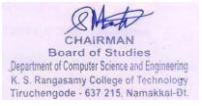
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E14 - Information Retrieval Techniques								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	2	0	2	60	3	50	50	100

INTRODUCTION Information Retrieval – Early Developments – The IR Problem – The User's Task – Information versus Data Retrieval - The IR System – The Software Architecture of the IR System – The Retrieval and Ranking Processes - The Web – The e-Publishing Era – How the web changed Search – Practical Issues on the Web – How People Search – Search Interfaces Today – Visualization in Search Interfaces.	[6]
MODELING AND RETRIEVAL EVALUATION IR models – Classic Information Retrieval – Alternative Set Theoretic Models – Alternative Algebraic Models – Alternative Probabilistic Models – Other Models – Hypertext Models – Web based Models – Retrieval Evaluation – Cranfield Paradigm – Retrieval Metrics – Reference Collections – User-based Evaluation – Relevance Feedback and Query Expansion – Explicit Relevance Feedback – Clicks – Implicit Feedback Through Local Analysis – Global Analysis – Documents: Languages & Properties – Queries: Languages & Properties.	[6]
TEXT CLASSIFICATION, INDEXING AND SEARCHING A Characterization of Text Classification – Unsupervised Algorithms – Supervised Algorithms – Feature Selection or Dimensionality Reduction – Evaluation metrics – Organizing the classes – Indexing and Searching – Inverted Indexes –Signature Files – Suffix Trees & Suffix Arrays – Sequential Searching – Multi-dimensional Indexing.	[6]
WEB RETRIEVAL AND WEB CRAWLING The Web – Search Engine Architectures – Search Engine Ranking – Managing Web Data – Search Engine User Interaction – Browsing – Applications of a Web Crawler – Taxonomy – Architecture and Implementation – Scheduling Algorithms – Evaluation - Structured Text Retrieval.	[6]
TYPES OF IR AND CASE STUDIES Parallel and Distributed IR –Data Partitioning – Parallel IR – Cluster-based IR – Distributed IR - Multimedia Information Retrieval – Challenges. **CASE STUDY** **Content Based Image Retrieval – Audio and Music Retrieval – Retrieving and Browsing Video – Fusion Models – Segmentation – Compression - Enterprise Search –Tasks – Architecture of Enterprise Search Systems – Enterprise Search Evaluation - Library Systems – Digital Libraries.**	[6]



Practical: 1. Representation of a Text Document in Vector Space Model and Computing Similarity between two documents. 2. Pre-processing of a Text Document: stop word removal and stemming 3. Construction of an Inverted Index for a given document collection comprising of at least 50 documents with a total vocabulary size of at least 1000 words. 4. Classification of a set of Text Documents into known classes (You may use any of the Classification algorithms like Naive Bayes, Max Entropy, Rochio's, Support Vector Machine). Standard Datasets will haveto be used to show the results. 5. Text Document Clustering using K-means. Demonstrate with a standard dataset and compute performance measures- Purity, Precision, Recall and F-measure. 6. Crawling/ Searching the Web to collect news stories on a specific topic (based on user input). The program should have an option to limit the crawling to certain selected websites only. 7. To parse XML text, generate Web graph and compute topic specific page rank 8. Matrix Decomposition and LSI for a standard dataset. 9. Mining Twitter to identify tweets for a specific period (and/or from a geographical location) and identify trends and named entities. 10. Implementation of PageRank on Scholarly Citation Network	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**
Text Book(s):	
1. Ricardo Baeza-Yates and Berthier Ribeiro-Neto, "Modern Information Retrieval: The Concepts and Technology behind Search", Second Edition, ACM Press Books, 2011	
2. Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, "Information Retrieval: Implementing and Evaluating Search Engines", The MIT Press, 2010.	
Reference(s):	
1. C. Manning, P. Raghavan, and H. Schütze, "Introduction to Information Retrieval", Cambridge University Press, 2008.	
2. Bruce Croft, Donald Metzler and Trevor Strohman, "Search Engines: Information Retrieval in Practice", First Edition, Addison Wesley, 2009	

*SDG 4 – Quality Education

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of Hours**
1	**INTRODUCTION**	
1.1	Information Retrieval - Early Developments	1
1.2	The IR Problem, The User‘s Task - Information versus Data Retrieval	1
1.3	The IR System, The e-Publishing Era	1
1.4	The Software Architecture of the IR System - The Retrieval and Ranking Processes	1
1.5	Practical Issues on the Web, How People Search	1
1.6	Search Interfaces Today, Visualization in Search Interfaces	1
2	**MODELING AND RETRIEVAL EVALUATION**	
2.1	IR models, Classic Information Retrieval	1
2.2	Alternative Set Theoretic Models, Algebraic Models, Probabilistic Models	1
2.3	Hypertext Models, Web based Models - Retrieval Evaluation, Cranfield Paradigm	1
2.4	Retrieval Metrics, Reference Collections, User-based Evaluation	1
2.5	Relevance Feedback and Query Expansion - Explicit Relevance Feedback	1

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2.6	Implicit Feedback Through Local Analysis - Global Analysis, Documents: Languages & Properties	1
3	**TEXT CLASSIFICATION, INDEXING AND SEARCHING**	
3.1	A Characterization of Text Classification	1
3.2	Supervised and Unsupervised Algorithms	1
3.3	Feature Selection or Dimensionality Reduction	1
3.4	Evaluation metrics , Organizing the classes	1
3.5	Indexing and Searching, Inverted Indexes - Sequential Searching, Multidimensional Indexing	1
3.6	Signature Files - Suffix Trees & Suffix Arrays	1
4	**WEB RETRIEVAL AND WEB CRAWLING**	
4.1	Search Engine Architectures - Search Engine Ranking	1
4.2	Managing Web Data - Search Engine User Interaction	1
4.3	Applications of a Web Crawler - Architecture and Implementation	1
4.4	Scheduling Algorithms	1
4.5	Evaluation	1
4.6	Structured Text Retrieval.	1
5	**TYPES OF IR AND CASE STUDIES**	
5.1	Parallel and Distributed IR	1
5.2	Data Partitioning	1
5.3	Cluster-based IR, Distributed IR	2
5.4	Multimedia Information Retrieval,	2
Practical:		
1.	Representation of a Text Document in Vector Space Model and Computing Similarity between two documents.	3
2.	Pre-processing of a Text Document: stop word removal and stemming	3
3.	Construction of an Inverted Index for a given document collection comprising of at least 50 documents with a total vocabulary size of at least 1000 words.	3
4.	Classification of a set of Text Documents into known classes (You may use any of the Classification algorithms like Naive Bayes, Max Entropy, Rochio's, Support Vector Machine). Standard Datasets will haveto be used to show the results.	3
5.	Text Document Clustering using K-means. Demonstrate with a standard dataset and compute performance measures- Purity, Precision, Recall and Fmeasure.	3
6.	Crawling/ Searching the Web to collect news stories on a specific topic (based on user input). The program should have an option to limit the crawling to certain selected websites only.	3
7.	To parse XML text, generate Web graph and compute topic specific page rank	3
8.	Matrix Decomposition and LSI for a standard dataset.	3
9.	Mining Twitter to identify tweets for a specific period (and/or from a geographical location) and identify trends and named entities.	3
10.	Implementation of PageRank on Scholarly Citation Network	3

Course Designer(s)

1. Mr. P. Sathishkumar – sathishkumar@ksrct.ac.in

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60 CS E15	Graph Theory	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To know and apply the fundamental concepts in graph theory.
- To learn the model problems using graphs and to solve these problems algorithmically.
- To acquire knowledge about trees in graph theory.
- To understand the concepts of sets, coverings and matchings and apply practically.
- To get exposed about the fundamentals of vertex colouring

Pre-requisites

 Linear Algebra

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Know the basic terminology and some of the theory associated with graphs.	Apply
CO2	Formulate graph theoretic models to solve real world problems.	Apply
CO3	Implement the concept of tree and graphs in real time applications.	Apply
CO4	Apply the concepts of sets and coverings in various engineering problems.	Apply
CO5	Evaluate the vertex colouring and edge colouring in the applications of graph theory.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	2	-	-	-	-	-	-	3	-	3	-
CO2	3	3	3	3	2	-	-	-	-	-	-	3	-	3	-
CO3	3	3	3	3	2	-	-	-	-	-	-	3	-	3	-
CO4	3	3	3	3	2	-	-	-	-	-	-	3	-	3	-
CO5	3	3	3	3	2	-	-	-	-	-	-	3	-	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Test 1	Test 2		

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	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	10	-
Understand	20	-	20	-	-	40	-
Apply	30	100	30	100	100	50	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E15 – Graph Theory								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	2	0	2	60	3	50	50	100

Basic Concepts in Graph Theory * Undirected graph – Degree of a vertex – Degree sequence – Sub graphs – Vertex induced sub graphs – Complement of a graph – Self complementary graphs – Walk – Path – Connectivity – Eccentricity – Radius – Diameter – Vertex and edge cuts – Vertex partition – Independent set – Clique. Digraph – Orientation – Strongly connected digraphs – Weekly connected digraphs – Unilaterally connected digraphs – Directed acyclic graph. Adjacency matrix –Incidence matrix of graphs.	[6]
Connected graphs and shortest paths ** Walks – trails – paths – cycles – Connected graphs – Distance – Cut-vertices and cutedges – Blocks – Connectivity – Weighted graphs and shortest paths – Dijkstra's shortest path algorithm – Floyd-Marshall shortest path algorithm.	[6]
Trees Definitions and characterizations – Number of trees – Cayley's formula – Kircho-matrix tree theorem – Minimum spanning trees – Kruskal's algorithm – Prim's algorithm –Special classes of graphs – Bipartite Graphs– Line Graphs– Chordal Graphs– Eulerian Graphs – Fleury's algorithm– Chinese Postman problem – Hamilton Graphs– Introduction – Necessary conditions and sufficient conditions.	[6]
Independent sets, coverings and matchings Introduction – Independent sets and coverings – Basic equation – Matchings in bipartite graphs – Hall's Theorem – Konig's Theorem – Perfect matchings in graphs– Greedy and approximation algorithms.	[6]
Vertex Colorings Basic definitions – Cliques and chromatic number – Mycielski's theorem – Greedy coloring algorithm – Coloring of chordal graphs – Brooks theorem – Edge Colorings – Introduction and Basics – Gupta-Vizing theorem – Class-1 and Class-2 graphs – Edge-coloring of bipartite graphs – Class-2 graphs – Hajos union and Class-2 graphs – A scheduling problem and equitable edge-coloring.	[6]

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Practical: 1. Program to find the number of vertices, even vertices, odd vertices and number of edges in a graph. 2. Program to find the union, intersection, and ring-sum of two graphs. 3. Program to find the minimum spanning tree using Prim's algorithm. 4. Program to find the minimum spanning tree using Kruskal's algorithm. 5. Program to find the shortest path between two vertices using Dijkstra algorithm. 6. Program to find the shortest path between every pair of vertices in a graph using Floyd-Warshall's algorithm. 7. Program to find the shortest path between two vertices using Bellman Ford's algorithm. 8. Program for finding maximum matching for the bipartite graph. 9. Program for finding maximum matching for the general path.	[30]

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Tiruchengode - 637 215, Namakkal-Dt.

10. Program to find maximum flow from source node to sink node using Ford-Fulkerson algorithm.	
Total Hours: (Lecture - 30; Practical - 30)	**60**
Text Book(s):	
1.	J. A. Bondy and U. S. R. Murty. Graph Theory, volume 244 of Graduate Texts in Mathematics. Springer, 1st edition, 2008.
2.	Jonathan L Gross and Jay Yellen, 'Graph Theory and its Applications', Chapman & Hall, New York, 2005.
Reference(s):	
1.	West D B, 'Introduction To Graph Theory', Pearson Education, New Delhi, 2007.
2.	Narsing Deo , 'Graph Theory with Applications to Engineering and Computer Science', Prentice Hall of India, New Delhi, 2005.
3.	Robin J. Wilson, 'Introduction to Graph Theory', Pearson Education Limited, 5th edition, 2010.
4.	Geetha P, 'Graph Theory', Scitech Publications(INDIA) Pvt. Ltd, Chennai,2012.

*SDG 4 – Industry Innovation and Infrastructure **SDG 12 – Production Patterns

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Basic Concepts In Graph Theory**	
1.1	Undirected graph, Degree of a vertex and Degree sequence	1
1.2	Sub graphs, Vertex induced sub graphs and Complement of a graph	1
1.3	Self-complementary graphs, Walk, Path and Connectivity	1
1.4	Eccentricity, Radius, Diameter, Vertex and edge cuts and Vertex partition	1
1.5	Independent set, Clique, Digraph, Orientation and Strongly connected digraphs - Weekly connected digraphs and Unilaterally connected digraphs	1
1.6	Directed acyclic graph, Adjacency matrix and Incidence matrix of graphs	1
2	**Connected graphs and shortest paths**	
2.1	Walks, trails, paths, cycles and Connected graphs	1
2.2	Distance, Cut-vertices and cut-edges	1
2.3	Blocks and Connectivity	1
2.4	Weighted graphs and shortest paths	1
2.5	Dijkstra's shortest path algorithm	1
2.6	Floyd-Marshall shortest path algorithm	1
3	**Trees**	

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3.1	Definitions and characterizations, Number of trees and Cayley's formula	1
3.2	Kircho-matrix tree theorem and Minimum spanning trees	1
3.3	Kruskal's algorithm and Prim's algorithm	1
3.4	Special classes of graphs, Bipartite Graphs, Line Graphs, Chordal Graphs and Eulerian Graphs	1
3.5	Fleury's algorithm and Chinese Postman problem	1
3.6	Hamilton Graphs - Necessary conditions and sufficient conditions	1
4	**Independent sets, coverings and matchings**	
4.1	Introduction, Independent sets and coverings	1
4.2	basic equations	1
4.3	Matchings in bipartite graphs	1
4.4	Hall's Theorem, Konig's Theorem	1
4.5	Perfect matchings in graphs	1
4.6	Greedy and approximation algorithms.	1
5	**Electric and Autonomous Vehicles**	
5.1	Basic definitions, Cliques and chromatic number	1
5.2	Mycielski's theorem, Greedy coloring algorithm	1
5.3	Coloring of chordal graphs, Brooks theorem and Edge Colorings	1
5.4	Basics, Gupta-Vizing theorem, Class-1 and Class-2 graphs	1
5.5	Edge-coloring of bipartite graphs, Class-2 graphs, Hajos union and Class-2 graphs	1
5.6	A scheduling problem and equitable edge-coloring	1
Practical:		
1.	Program to find the number of vertices, even vertices, odd vertices, and number of edges in a graph.	3
2.	Program to find the union, intersection, and ring-sum of two graphs.	3
3.	Program to find the minimum spanning tree using Prim's algorithm.	3
4.	Program to find the minimum spanning tree using Kruskal's algorithm.	3
5.	Program to find the shortest path between two vertices using Dijkstra algorithm.	3
6.	Program to find the shortest path between every pair of vertices in a graph using Floyd-Warshall's algorithm.	3
7.	Program to find the shortest path between two vertices using Bellman Ford's algorithm.	3
8.	Program for finding maximum matching for the bipartite graph.	3
9.	Program for finding maximum matching for the general path.	3
10.	Program to find maximum flow from source node to sink node using FordFulkerson algorithm.	3

Course Designer(s)

1. Dr.K.Kiruthika - kiruthika@ksrct.ac.in

60 CS E16	Industrial Cloud Practices	Category	L	T	P	Credit
		PE	3	0	0	3

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Objectives

- Equip participants with a comprehensive understanding of cloud computing principles, AWS services, and security fundamentals to confidently initiate their cloud journey
- Enable participants to grasp fundamental concepts of cloud-based compute resources, specifically focusing on Amazon Elastic Compute Cloud (Amazon EC2) and related services, including containerization and orchestration, fostering a solid foundation for practical application
- Provide a concise understanding of OSI model layers, foundational AWS networking and security services, and proactive vulnerability prevention within the AWS cloud environment
- Immerse learners in the realm of AWS storage solutions, covering the diverse offerings of block storage, object storage, and database services, while facilitating practical skills in hosting websites through Amazon S3
- Equip participants with a comprehensive understanding of AWS monitoring and cost management tools, specifically focusing on CloudTrail, CloudWatch, and effective cloud cost optimization strategies

Pre-requisites

- Programming Skill, Computer Networks, DBMS

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Possess a clear grasp of cloud computing concepts, the advantages of cloud adoption, the significance of AWS, and the foundational knowledge to utilize key AWS services effectively, while also demonstrating an understanding of cloud security essentials and initial steps to set up an AWS account and explore its service offerings.	Understand
CO2	Understand the benefits of Amazon EC2 and its various instance types, distinguishing among billing options, comprehending dynamic scaling through features like Amazon EC2 Auto Scaling and Elastic Load Balancing, grasping containerization history and technologies, explaining AWS container offerings like Fargate and Amazon EKS, and practically creating an EC2 instance using a t2.micro instance type.	Understand
CO3	Gain the knowledge of OSI model's structure, AWS networking services including subnetting, Virtual Private Cloud (VPC), security essentials like Security Groups and Network Access Control Lists (NACLs), AWS's comprehensive security measures and global infrastructure, strategies to prevent and detect vulnerabilities, and practical skills to create a VPC with multiple subnets across different availability zones.	Understand
CO4	Understand the Amazon Elastic Block Store (EBS) and its volume types, performance distinctions, and EC2 instance store applications. They will also be adept in comprehending Amazon S3's object storage services, storage classes, tiering options, data protection, AWS database options including RDBMS and NoSQL (DynamoDB), and will have the practical ability to create an S3 bucket and host a static website.	Understand

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO5	Understand CloudTrail operations, application scenarios, cost structures, and benefits. They will also gain an understanding of Amazon CloudWatch, CloudWatch Logs, and Log Insights, along with the ability to query logs from CloudWatch Logs. Additionally, participants will become proficient in cloud financial management, cost optimization considerations, and practical skills such as sending CloudTrail logs to CloudWatch, running Log Insights queries, and validating their results.	Understand

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	-	-	-	-	-	2	-	-	-	-	-
CO2	3	2	3	2	-	-	-	-	-	2	-	2	2	-	-
CO3	3	2	3	2	2	-	-	-	3	2	-	-	-	3	-
CO4	3	3	3	2	-	-	-	-	-	2	-	-	-	3	-
CO5	3	3	2	2	2	-	-	-	3	2	-	2	2	3	-
3 – Strong; 2 – Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	40	40	70
Apply	-	-	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E16- Industrial Cloud Practices								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Overview of Cloud Computing*: Exploring the Concept of Cloud Computing, Understanding the Benefits of Cloud Adoption - Selecting AWS: Reasons and Advantages - Initiating Your Journey: Getting Started with Cloud and AWS - **Introduction to AWS:** Getting Started in the AWS Cloud, Understanding the AWS Global Infrastructure - **Core Services Part I:** Explore AWS Cloud Computing Fundamentals, Delve into AWS Cloud Storage Essentials, Gain Insight into AWS Cloud Database Services - **Core Services Part II:** Understand Networking in Core AWS Services, Explore Security Aspects in Core AWS Services, Grasp Pricing Essentials of Core AWS Services - **Security Basics:** Identity and Access Management. **Case Study: A Kick Start - Cloud Journey:** Open AWS Cloud Account - Review the Services Offerings from Compute, Storage, Database, Networking, Security.	[9]
Compute in the Cloud*: Benefits of Amazon Elastic Compute Cloud (Amazon EC2) at a basic level, Identify the different Amazon EC2 instance types, Differentiate between the various billing options for Amazon EC2, Benefits of Amazon EC2 Auto Scaling - **Dynamic Scaling and Hosting in the Cloud:** Summarize the benefits of Elastic Load Balancing, Give an example of the uses for Elastic Load Balancing, Summarize additional AWS compute options - **Learn Container Concepts:** History of Containerization, Container Technologies, Microservices and Management - **Learn AWS Container Offerings:** Explain the functioning of Fargate, What is Container Orchestration Environment, Learn the fundamentals of AWS EKS. **Case Study:** Create EC2 Instance - t2. Micro.	[9]
Introduction to OSI Layer*: OSI Model Overview, Physical and Data Link Layers, Network and Transport Layers Session, Presentation, and Application Layers - **AWS Networking Services Fundamentals:** Learn the concept of Subnetting, Amazon Virtual Private Cloud, Security Group, NACL - **AWS Security Services Fundamentals:** Cloud Security Measures, The Worldwide Infrastructure of AWS, Ensuring Data Center Security, Adhering to Compliance and Governance, Countering DDoS Attacks - **Prevention and Detection Vulenarabities in AWS Cloud:** Introduction to AWS Entry Points, Identity and Access Management in AWS, Exploring Detective Controls, Securing Infrastructure in Cloud, Ensuring Data Protection in AWS, Incident Response Strategies in Cloud Environment. **Case Study:** Create a VPC and 2 Subnets in Different Availability Zone.	[9]
AWS Block Storage*: Amazon EBS Block Storage Service, Amazon EBS Volume Types, Performance Differentiation of Amazon EBS Volume Types, Uses for Amazon EC2 Instance Stores, Retention Options for EBS Volumes - **AWS Object Storage Basic:** Amazon S3 Object Storage Services, Amazon S3 Storage Classes Distinguishing Amazon S3 Glacier Storage Classes, Storage Class Data Tiering Options, Data Protection for Amazon S3 - **AWS Database offerings – RDBMS:** Discerning Among AWS Database Options, Exploring Amazon Relational Database Service (RDS) Value, Unveiling Amazon Aurora Architecture, Achieving High Performance with Amazon Aurora - **AWS Database offerings - NoSQL – DynamoDB:** What is NoSQL and why we need it, Amazon DynamoDB Fundamentals, Terminology and Technology Concepts. **Case Study: Host Website in S3 Bucket:** Create a S3 Bucket and Host a Static Website.	[9]

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Learn the CloudTrail*: CloudTrail Operation Understanding, Surveying CloudTrail Application Scenarios, CloudTrail Cost Structure Explanation, Recognizing CloudTrail Advantages - **Understand the Cloudwatch, Cloudwatch Logs and Log Insights:** Introduction to Amazon CloudWatch, Log files from Amazon Elastic Compute Cloud (Amazon EC2) instances, AWS CloudTrail, Query the logs from Cloudwatch Logs - **Cloud Cost Management:** Understand Cloud Financial Management, Six capabilities to have to be successful in your Cloud Financial Management journey - **Cost Optimization:** Cloud Usage with Cost Consideration, Enhance Cloud Utilization, Purchase Choices Based on Commitment. **Case Study: Explore CloudTrail and CloudWatch:** Send the Logs from CloudTrail to Cloudwatch, Run LogInsights query and Validate it.	[9]
Total Hours:	**45**

Text Book(s):	
1.	https://www.amazon.in/-/hi/Neal-Davis/dp/1073015513
2.	https://www.amazon.in/Certified-Cloud-Practitioner-CLF-C01-Pearson/dp/9353945364
Reference(s):	
1	https://explore.skillbuilder.aws/learn/course/internal/view/elearning/15120/cloud-for-ceos
	https://explore.skillbuilder.aws/learn/course/internal/view/elearning/15009/getting-startedwithaws-cloud-essentials https://explore.skillbuilder.aws/learn/course/internal/view/elearning/454/aws-identity-andaccessmanagement-basics https://explore.skillbuilder.aws/learn/learning_plan/view/82/cloud-essentials-learning-planearn-alearning-badge https://explore.skillbuilder.aws/learn/course/internal/view/elearning/2486/introduction-tocontainerconcepts https://explore.skillbuilder.aws/learn/course/internal/view/elearning/13380/getting-startedwithaws-fargate https://explore.skillbuilder.aws/learn/course/internal/view/elearning/12439/aws-networkingbasics https://explore.skillbuilder.aws/learn/course/internal/view/elearning/4791/differencesbetweensecurity-groups-and-nacls" https://explore.skillbuilder.aws/learn/course/internal/view/elearning/13105/securityfundamentals-301 https://explore.skillbuilder.aws/learn/course/internal/view/elearning/16650/aws-blockstorageservices-getting-started https://explore.skillbuilder.aws/learn/course/internal/view/elearning/16651/aws-objectstorageservices-getting-started https://explore.skillbuilder.aws/learn/course/internal/view/elearning/1383/aws-databaseservicesnavigate-technical https://explore.skillbuilder.aws/learn/course/internal/view/elearning/324/amazondynamodbservice-primer https://explore.skillbuilder.aws/learn/course/internal/view/elearning/193/getting-started-withawscloudtrail https://explore.skillbuilder.aws/learn/course/internal/view/elearning/203/introduction-toamazoncloudwatch https://explore.skillbuilder.aws/learn/course/internal/view/elearning/191/introduction-toamazoncloudwatch-logs https://explore.skillbuilder.aws/learn/course/internal/view/elearning/265/introduction-toamazoncloudwatch-logs-insights" https://explore.skillbuilder.aws/learn/course/internal/view/elearning/1955/aws-foundationscostmanagement https://explore.skillbuilder.aws/learn/course/internal/view/elearning/10803/aws-cloud-forfinance-professionals

*SDG 9 – Industry Innovation and Infrastructure

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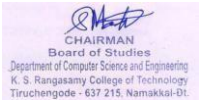
Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Overview of Cloud Computing**	
1.1	Exploring the Concept of Cloud Computing, Understanding the Benefits of Cloud Adoption	1
1.2	Selecting AWS: Reasons and Advantages	1
1.3	Initiating Your Journey: Getting Started with Cloud and AWS	1
1.4	Introduction to AWS: Getting Started in the AWS Cloud, Understanding the AWS Global Infrastructure	1
1.5	Core Services Part I: Explore AWS Cloud Computing Fundamentals, Delve into AWS Cloud Storage Essentials, Gain Insight into AWS Cloud Database Services	1
1.6	Core Services Part II: Understand Networking in Core AWS Services, Explore Security Aspects in Core AWS Services, Grasp Pricing Essentials of Core AWS Services	1
1.7	Security Basics: Identity and Access Management**.**	1
1.8	Case Study: A Kick Start - Cloud Journey: Open AWS Cloud Account	1
1.9	Review the Services Offerings from Compute, Storage, Database, Networking, and Security.	1
2.0	**Compute in the Cloud**	
2.1	Benefits of Amazon Elastic Compute Cloud (Amazon EC2) at a basic level, Identify the different Amazon EC2 instance types, Differentiate between the various billing options for Amazon EC2, Benefits of Amazon EC2 Auto Scaling	2
2.2	Dynamic Scaling and Hosting in the Cloud**:** Summarize the benefits of Elastic Load Balancing, Give an example of the uses for Elastic Load Balancing, Summarize additional AWS compute options	2
2.3	Learn Container Concepts: History of Containerization, Container Technologies, Micro services and Management	2
2.4	Learn AWS Container Offerings: Explain the functioning of Fargate, What is Container Orchestration Environment, Learn the fundamentals of AWS EKS.	2
2.5	Case Study: Create EC2 Instance - t2. Micro	1
3.0	**Introduction to OSI Layer**	
3.1	OSI Model Overview, Physical and Data Link Layers, Network and Transport Layers Session, Presentation, and Application Layers	2
3.2	AWS Networking Services Fundamentals: Learn the concept of Subnetting, Amazon Virtual Private Cloud, Security Group, NACL	1
3.3	AWS Security Services Fundamentals: Cloud Security Measures, The Worldwide Infrastructure of AWS, Ensuring Data Center Security, Adhering to Compliance and Governance, Countering DDoS Attacks	2
3.4	Prevention and Detection Vulenarabities in AWS Cloud: Introduction to AWS Entry Points, Identity and Access Management in AWS, Exploring Detective Controls, Securing Infrastructure in Cloud, Ensuring Data Protection in AWS, Incident Response Strategies in Cloud Environment	2
3.5	Case Study: Create a VPC and 2 Subnets in Different Availability Zone	2
4.0	**AWS Block Storage**	



4.1	Amazon EBS Block Storage Service, Amazon EBS Volume Types, Performance Differentiation of Amazon EBS Volume Types, Uses for Amazon EC2 Instance Stores, Retention Options for EBS Volumes.	2
4.2	AWS Object Storage Basic: Amazon S3 Object Storage Services, Amazon S3 Storage Classes Distinguishing Amazon S3 Glacier Storage Classes, Storage Class Data Tiering Options, Data Protection for Amazon S3	2
4.3	AWS Database offerings – RDBMS: Discerning Among AWS Database Options, Exploring Amazon Relational Database Service (RDS) Value, Unveiling Amazon Aurora Architecture, Achieving High Performance with Amazon Aurora.	1
4.4	AWS Database offerings - NoSQL – DynamoDB**:** What is NoSQL and why we need it, Amazon DynamoDB Fundamentals, Terminology and Technology Concepts.	2
4.5	Case Study: Host Website in S3 Bucket**:** Create a S3 Bucket and Host a Static Website	2
5.0	**Learn the CloudTrail**	
5.1	CloudTrail Operation Understanding, Surveying CloudTrail Application Scenarios, CloudTrail Cost Structure Explanation, Recognizing CloudTrail Advantages.	2
5.2	Understand the Cloudwatch, Cloudwatch Logs and Log Insights: Introduction to Amazon CloudWatch, Log files from Amazon Elastic Compute Cloud (Amazon EC2) instances, AWS CloudTrail, Query the logs from Cloudwatch Logs.	2
5.3	Cloud Cost Management: Understand Cloud Financial Management, Six capabilities to have to be successful in your Cloud Financial Management journey.	2
5.4	Optimization: Cloud Usage with Cost Consideration, Enhance Cloud Utilization, Purchase Choices Based on Commitment.	2
5.5	Case Study: Explore CloudTrail and CloudWatch: Send the Logs from CloudTrail to Cloudwatch, Run LogInsights query and Validate it	1

Course Designer(s)

1. M. Varshana Devi – varshanadevi@ksrct.ac.in

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60 CS E17	DevOps	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- Understand the concept of DevOps
- Understand the Continuous Integration in Automated Testing and Reporting
- Explore Configuration Management, Continuous Delivery and Deployment
- Know the concept of Containerization and Orchestration
- Analyse the Security and Compliance

Pre-requisites

- Programming Skill, Operating Systems and Networking

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recognize the concept of DevOps	Remember
CO2	Apply Continuous Integration in Automated Testing and Reporting	Apply
CO3	Analyze Configuration Management, Continuous Delivery and Deployment	Analyse
CO4	Understand the Containerization and Orchestration	Understand
CO5	Evaluate the Security and Compliance	Apply

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	2	-	-	-	2	2	-	2	-	3	-
CO2	3	3	3	-	3	3	-	2	2	2	-	2	2	3	-
CO3	3	3	3	3	3	2	-	2	2	2	-	2	2	3	-
CO4	3	3	2	2	3	3	-	2	2	2	-	2	2	3	-
CO5	3	3	3	-	3	-	-	-	2	2	-	3	2	3	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	30
Apply	30	20	30
Analyse	-	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E17- DevOps								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction to DevOps: What is DevOps? - Benefits of DevOps - DevOps Principles - DevOps Culture and Collaboration. **Version Control and Collaboration Tools:** - Introduction to Version Control (Git) - Git Basics: Clone, Commit, Push, Pull - Branching and Merging - Collaborative Development with Git - Introduction to Git Hub/ Git Lab/ Bi bucket.	[9]
Continuous Integration (CI) CI/CD Pipeline Overview - Building and Testing Code Automatically - Introduction to Jenkins or other CI tools - Configuring Jenkins Jobs - Integration with Version Control - Automated Testing and Reporting.	[8]
Configuration Management Infrastructure as Code (IaC) concepts - Introduction to Configuration Management Tools (e.g., Ansible) - Creating Playbooks/Roles for Automated Deployment - Managing Configuration Drift. **Continuous Delivery and Deployment** Understanding Continuous Delivery vs. Continuous Deployment - Blue-Green Deployments - Canary Deployments - Release Orchestration.	[10]
Containerization and Orchestration Introduction to Containers (Docker) - Creating Docker Images - Container Registries (Docker Hub, AWS ECR) - Introduction to Kubernetes - Deploying Containers with Kubernetes **Monitoring and Logging** Importance of Monitoring and Observability - Monitoring Tools (Prometheus, Grafana) - Application Logging and Log Management.	[10]
Security and Compliance Security Principles in DevOps - Incorporating Security in CI/CD - Compliance and Auditing in DevOps. **Cloud Services and DevOps** Cloud Computing Overview - Infrastructure Automation in the Cloud - Serverless Architectures. **DevOps Best Practices and Case Studies** Industry Best Practices - Case Studies of Successful DevOps Implementations.	[8]
Hands On: - Applying DevOps Concepts to a Sample Project. - Setting Up a CI/CD Pipeline. - Deploying and Monitoring the Application.	
Total Hours:	**45**
Text Book(s):	

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1.	Gene Kim, Patrick Debois, John Willis, “The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations”, IT Revolution Press; Illustrated edition, October 6, 2016.
2.	Mikael Krief, “Learning DevOps: A comprehensive guide to accelerating DevOps culture adoption with Terraform, Azure DevOps, Kubernetes, and Jenkins”, Packt Publishing; 2nd ed. Edition, March 31, 2022.
Reference(s):	
1.	Emily Freeman, “DevOps For Dummies”, For Dummies; 1st edition, August 20, 2019.
2.	Gaurav Agarwal, “Modern DevOps Practices: Implement and secure DevOps in the public cloud with cutting-edge tools, tips, tricks, and techniques”, Packt Publishing, September 13, 2021.
3.	Martyn Coupland, “DevOps Adoption Strategies: Principles, Processes, Tools, and Trends: Embracing DevOps through effective culture, people, and processes”, Packt Publishing, July 9, 2021.
4.	Christopher Cowell, Nicholas Lotz, Chris Timberlake, “Automating DevOps with GitLab CI/CD Pipelines: Build efficient CI/CD pipelines to verify, secure, and deploy your code using real-life examples”, Packt Publishing, February 24, 2023.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to DevOps**	
1.1	What is DevOps? - Benefits of DevOps	1
1.2	DevOps Principles	1
1.3	DevOps Culture and Collaboration	1
1.4	Version Control and Collaboration Tools	1
1.5	Introduction to Version Control (Git	1
1.6	Git Basics: Clone, Commit, Push, Pull	1
1.7	Branching and Merging	1
1.8	Collaborative Development with Git	1
1.9	Introduction to Git Hub/ Git Lab/ Bi bucket	1
2.0	**Continuous Integration (CI)**	
2.1	CI/CD Pipeline Overview	1
2.2	Building and Testing Code Automatically	2
2.3	Introduction to Jenkins or other CI tools	1
2.4	Configuring Jenkins Jobs	2
2.5	Integration with Version Control	1
2.6	Automated Testing and Reporting	1
3.0	**Configuration Management**	
3.1	Infrastructure as Code (IaC) concepts	1
3.2	Introduction to Configuration Management Tools (e.g., Ansible)	1
3.3	Creating Playbooks/Roles for Automated Deployment	1
3.4	Managing Configuration Drift	1
3.5	Continuous Delivery and Deployment Understanding Continuous Delivery vs. Continuous Deployment	2
3.6	Blue-Green Deployments	1

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3.7	Canary Deployments	2
3.8	Release Orchestration	1
4.0	**Containerization and Orchestration**	
4.1	Introduction to Containers (Docker)	2
4.2	Creating Docker Images	1
4.3	Container Registries (Docker Hub, AWS ECR)	2
4.4	Introduction to Kubernetes	1
4.5	Deploying Containers with Kubernetes	1
4.6	Monitoring and Logging Importance of Monitoring and Observability	1
4.7	Monitoring Tools (Prometheus, Grafana)	1

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Tiruchengode - 637 215, Namakkal-Dt.

4.8	Application Logging and Log Management	1
5.0	**Security and Compliance**	
5.1	Security Principles in DevOps	1
5.2	Incorporating Security in CI/CD	1
5.3	Compliance and Auditing in Dev Ops	1
5.4	Cloud Services and Dev Ops Cloud Computing Overview	2
5.5	Infrastructure Automation in the Cloud	1
5.6	DevOps Best Practices and Case Studies Industry Best Practices	1
5.7	Case Studies of Successful DevOps Implementations	1

Course Designer(s)

1. Mr. K. Dineshkumar – dineshkumar@ksrct.ac.in

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60 CS E21	Generative AI	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To get an introduction to Generative AI
- To learn the language models and LLM architectures of generative AI
- To understand the Generative Pre-Trained Transformer
- To work with LangChain framework
- To learn about prompt engineering

Pre-requisites

- Knowledge on statistics, linear algebra, matrix, calculus, probability, programming languages and data modelling

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the generative AI basics	Understand
CO2	Apply the language models and LLM architectures in generative AI	Apply
CO3	Develop the ChatGPT from Generative Pre-trained Transformer	Apply
CO4	Recognize the concept of LangChain framework	Apply
CO5	Comprehend the concept of Prompt Engineering	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	2	3	-	-	-	3	2	-	-	3	-	-
CO2	3	2	3	2	3	2	2	-	3	2	-	-	3	-	-
CO3	3	2	3	-	3	2	-	-	3	2	-	3	3	-	-
CO4	3	2	3	-	3	-	-	3	3	2	-	3	3	3	-
CO5	3	2	3	2	3	2	1	3	3	2	-	3	3	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	30	30	50
Apply	20	20	30
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E - Computer Science and Engineering								
60 CS E21 – Generative AI								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction to Generative AI* Introduction to Artificial Intelligence – Machine Learning -Difference between AI and Machine Learning – Deep Learning – Deep Learning Model Types - Generative AI - Definition and scope of Generative AI - Overview of generative models and their applications - Importance of Generative AI in various domains - Ethical considerations and challenges	[8]
Generative AI: Language Models and LLM Architectures* Introduction to language models and their role in AI - Traditional approaches to language modeling - Deep learning-based language models and their advantages - Overview of popular LLM architectures: RNNs, LSTMs, and Transformers	[9]
Understanding GPT (Generative Pre-trained Transformer)** Introduction to GPT and its significance - Pre-training and fine-tuning processes in GPT Architecture and working of GPT models - Overview of GPT variants and their use cases **ChatGPT: A Practical Application of GPT** Introduction to ChatGPT and its purpose - Training data and techniques for ChatGPT - Handling user queries and generating responses - Tips for improving ChatGPT's performance	[10]
LangChain: Simplifying Development with Language Models** Introduction to LangChain and its objectives - Overview of the LangChain framework and its components - Streamlining application development using LangChain - Examples of applications built with LangChain	[9]

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Prompt Engineering: Enhancing Model Outputs** Understanding the concept and significance of prompt engineering - Strategies for designing effective prompts - Techniques for controlling model behavior and output quality - Best practices for prompt engineering in generative AI.		[9]
	Total Hours:	**45**
Text Book(s):		
1.	Ian Goodfellow, YoshuaBengio, Aaron Courville, “Deep Learning”, Illustrated edition, The MIT Press, 2016.	
2.	Alger Fraley, “The Artificial Intelligence and Generative AI Bible”, AlgoRay Publishing, 2023.	
Reference(s):		
1.	David Foster, “Generative Deep Learning”, O'Reilly Media, Inc, 2019	
2.	Michael Negnevitsky, “Artificial Intelligence: A Guide to Intelligent Systems Paperback”, 2011	
3.	Jakub Langr, Vladimir Bok,“GANs in Action: Deep learning with Generative Adversarial Networks”, First Edition, Manning, 2019.	
4.	Joseph Babcock, Raghav Bali,“Generative AI with Python and TensorFlow 2: Create images, text, and music with VAEs, GANs, LSTMs, Transformer models”, Packt Publishing Limited, 2021	

*SDG 4 – Quality Education

**SDG 3 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Generative AI**	
1.1	Introduction to Artificial Intelligence	1
1.2	Machine Learning ,Difference between AI and Machine Learning	1
1.3	Deep Learning ,Deep Learning Model Types	1
1.4	Generative AI , Definition and scope of Generative AI ,Overview of generative models and their applications	2
1.5	Importance of Generative AI in various domains - Ethical considerations and challenges	2
1.6	Ethical considerations and challenges	1
2.0	**Generative AI: Language Models and LLM Architectures**	
2.1	Introduction to language models and their role in AI	3
2.2	Traditional approaches to language modeling	2
2.3	Deep learning-based language models and their advantages	2
2.4	Overview of popular LLM architectures: RNNs, LSTMs, and Transformers	2
3.0	**Understanding GPT (Generative Pre-trained Transformer)**	
3.1	Introduction to GPT and its significance	1
3.2	Pre-training and fine-tuning processes in GPT	1

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3.3	Architecture and working of GPT models	1
3.4	Overview of GPT variants and their use cases	1
3.5	Introduction to ChatGPT and its purpose	2
3.6	Training data and techniques for ChatGPT	2
3.7	Handling user queries and generating responses	1
3.8	Tips for improving ChatGPT's performance	1
4.0	**LangChain: Simplifying Development with Language Models**	
4.1	Introduction to LangChain and its objectives	2
4.2	Overview of the LangChain framework and its components	3
4.3	Streamlining application development using LangChain	3
4.4	Examples of applications built with LangChain	1
5.0	**Prompt Engineering: Enhancing Model Outputs**	
5.1	Understanding the concept and significance of prompt engineering	2
5.2	Strategies for designing effective prompts	3
5.3	Techniques for controlling model behavior and output quality	2
5.4	Best practices for prompt engineering in generative AI	2

Course Designer(s)

1. Dr. K.Poongodi -poongodik@ksrct.ac.in

60 CS E22	Angular	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- Understanding Basic concept of Angular.
- Properly separate the model, view, and controller layers of your application and implement them using Angular.
- Master Angular expressions, filters, Angular directives and scopes.
- Build Angular forms.
- Understand the design of single-page applications and how AngularJS facilitates their development

Pre-requisites

- HTML, CSS, JavaScript

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Build an awesome User Interface	Apply
CO2	Create and bind controllers with JavaScript	Analyse
CO3	Validate user input data	Analyse
CO4	Write own filters, directives and controls	Apply
CO5	Create animation in web page and Create single page application	Apply

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Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	2	3	-	-	2	2	2	3	3	3	2	-
CO2	3	2	2	2	3	-	-	2	2	2	3	3	3	2	-
CO3	3	2	2	2	3	-	-	2	2	2	3	3	3	2	-
CO4	3	2	2	2	3	-	-	2	2	2	3	3	3	2	-
CO5	3	2	2	2	3	-	-	2	2	2	3	3	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	10	-
Understand	10	-	15	-	-	20	-
Apply	20	50	15	50	50	50	50
Analyse	20	50	20	50	50	20	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 CS E22 - Angular							
Semester	Hours / Week			Total Hours	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
VI	2	0	2	60	3	50	50	100
Introduction What is AngularJS?, Why AngularJS?, Features of AngularJS, AngularJS architecture, Setting up the Environment, Model-View-Controller explained, My first AngularJS app, All about Angular expressions, How to use expressions, Number and String Expressions.							[6]

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Data and Event Binding Object Binding and Expressions, Working with Arrays, Forgiving Behaviour, Angular expressions v/s Javascript expressions, Built-in filters, Uppercase and Lowercase Filters, Currency and Number Formatting Filters, OrderBy Filter, Filter Filter, Using AngularJS filters, Creating custom filters - Introduction to AngularJS Modules, Module Loading and Dependencies, Creation vs Retrieval, Bootstrapping AngularJS Role of a Controller, Attaching properties and functions to scope, Nested Controllers.	[6]
Directives Introduction to Directives, Directive lifecycle, Using AngularJS built-in directives, Core Directives, Conditional Directives, Style Directives, Mouse and Keyboard Events Directives, Matching directives, Creating a custom directives.	[6]
Forms Working with Angular Forms, Model binding, Understanding Data Binding, Binding controls to data, Form controller, Validating Angular Forms, Form events, Updating models with a twist, $error object What is scope, Scope lifecycle, Two way data binding, Scope inheritance, Scope & controllers, Scope & directives, $apply and $watch, Rootscope, Scope broadcasting, Scope events	[6]
Single Page Application (SPA)* what is SPA, Pros & Cons of SPA, Installing the ngRoute module, Configure routes, Passing parameters, Changing location, Resolving promises, Create a Single Page Application AngularJS Animation - ngAnimate Module, CSS transforms, CSS transitions, Applying animations, Directives supporting animation.	[6]
Practical: 1. Build an Angular Application and serve it on a server. 2. Create an Angular application. Build a component inside the application in order to implement a simple login form. 3. Create an Angular application. Create a component to implement two-way binding which is a combination of both property binding and event binding. 4. Create an Angular application. Create a component to define the switch structural directive. The user will enter their choice of course based on which the switch directive will choose an appropriate output. 5. Write a program to show thw responses while the Form is in the Submitted State and provide an Edit Button. 6. Create an Angular application. Create a component to inject a service into it. The component will also display the data provided by the service. The service will provide an array of employee details.	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Aristeidis Bampakos, Pablo Deeleman, “Learning Angular: A no-nonsense guide to building web applications with Angular 15”, 4th Edition,2023.
2.	Cory Rylan - Google Developer Expert, “Angular Form Essentials: Learn the essentials to get started creating forms with Angular”, 2019.
Reference(s):	
1.	Adam Freeman, “Pro Angular 9”, 4th Edition, Unknown Binding, 2020.
2.	Doguhan Uluca, “Angular 8 for Enterprise-Ready Web Applications -: Build and deliver production-grade and evergreen Angular apps at cloud-scale”, 2020.

*SDG 4 – Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction**	

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.1	AngularJS, Features of AngularJS, AngularJS architecture	1
1.2	Setting up the Environment	1
1.3	Model-View-Controller explained	1
1.4	View-Controller explained	1
1.5	My first AngularJS app All about Angular expressions	1
1.6	How to use expressions, Number and String Expressions.	1
2	**Data and Event Binding**	
2.1	Object Binding and Expressions, Working with Arrays	1
2.2	Forgiving Behaviour, Angular expressions v/s Javascript expressions	1
2.3	Built-in filters, Uppercase and Lowercase Filters	1
2.4	Currency and Number Formatting Filters	1
2.5	OrderBy Filter, Filter Filter, Using AngularJS filters, Creating custom filters Introduction to AngularJS Modules, Module Loading and Dependencies	1
2.6	Bootstrapping AngularJS Role of a Controller, Attaching properties and functions to scope, Nested Controllers	1
3	**Directives**	
3.1	Introduction to Directives	1
3.2	Directive lifecycle, Using AngularJS built-in directives,	1
3.3	Core Directives, Conditional Directives	1
3.4	Style Directives, Mouse and Keyboard Events Directives	1
3.5	Matching directives	1
3.6	Creating a custom directives	1
4	**Forms**	
4.1	Working with Angular Forms, Model binding, Understanding Data Binding	1
4.2	Binding controls to data, Form controller, Validating Angular Forms	1
4.3	Form events, Updating models with a twist, $error object	1
4.4	What is scope, Scope lifecycle,	1
4.5	Two way data binding, Scope inheritance, Scope & controllers, Scope & directives	1
4.6	$apply and $watch, Rootscope, Scope broadcasting, Scope events.	1
5	**Single Page Application (SPA)***	
5.1	what is SPA, Pros & Cons of SPA, Installing the ngRoute module, Configure routes	1
5.2	Passing parameters, Changing location	1
5.3	Changing location, Resolving promises	1
5.4	Create a Single Page Application AngularJS Animation	1
5.5	ngAnimate Module, CSS transforms, CSS transitions	1
5.6	Applying animations, Directives supporting animation.	1

Practical:		
1.	Build an Angular Application and serve it on a server	5
2.	Create an Angular application. Build a component inside the application in order to implement a simple login form	5
3.	Create an Angular application. Create a component to implement two-way binding which is a combination of both property binding and event binding	5

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.	Create an Angular application. Create a component to define the switch structural directive. The user will enter their choice of course based on which the switch directive will choose an appropriate output	5
5.	Write a program to show thw responses while the Form is in the Submitted State and provide an Edit Button	5
6.	Create an Angular application. Create a component to inject a service into it. The component will also display the data provided by the service. The service will provide an array of employee details	5

Course Designer(s)

1. Ms. Varshana Devi M - varshanadevi@ksrct.ac.in

CHAIRMAN
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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS E23	User Interface Technologies	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand User Interface design and web languages
- To understand the web applications and client server communication
- To program for web client and web server objects
- To understand web development environment and methodology
- To learn the reactive frameworks

Pre-requisites

- Web Development

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the User Interface Design essentials and scripting language	Understand
CO2	Develop Web Applications and Implement Client/Server Web programming	Apply
CO3	Recognize the Web servers and frameworks	Apply
CO4	Understand MongoDB and Node JS applications	Understand
CO5	Apply Reactive Frameworks	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	3	2	3	-	-	-	-	-	-	-	2	3	-
CO2	-	-	3	2	3	-	-	-	-	-	-	-	2	3	-
CO3	-	-	3	2	3	-	-	-	-	-	-	-	2	3	-
CO4	-	-	3	2	3	-	-	-	-	-	-	-	2	3	-
CO5	-	-	3	2	3	-	-	-	-	-	-	-	2	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	25	25	30
Apply	25	25	50
Analyse	-	-	-

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E - Computer Science and Engineering								
60 CS E23 – User Interface Technologies								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction to UI Design and Client side scripting* Introduction-The process of UI design-Elements-Good Vs Bad UI –Web Design issuesHTML –XHTML-CSS-Javascript Basics –Arrays-Functions –Javascript objects – HTML DOM -DOM methods –Events-Regular Expressions –Form Validation-JSON-Jquery.	[14]
Web applications and Client-Server Communications* Web applications-Web Application Frameworks-MVC framework-Angular JS –Single Page Applications-Responsive Web Design-HTTP-Request/Response Model-HTTP MethodsRESTful APIs-AJAX-AJAX with JSON.	[9]
Webservers* Node.js- NPM-Callbacks –Events-Express framework-Cookies-Sessions-Scaling	[7]
Storage* MongoDB-Manipulating and Accessing MongoDB Documents from Node js	[7]
Reactive Frameworks* Meteor JS framework –Templates –Events –Sessions –Publish & Subscribe –Accounts	[8]
Total Hours:	**45**

Text Book(s):	
1.	Brad Dayley, “Node.js, MongoDB, and Angular JS Web Development”, Addison Wesley, 2014.
2.	Jenifer Tidwell, Charles Brewer, Aynne Valencia, “Designing Interfaces”, 3rd edition, O’rielly Publication, 2020.
Reference(s):	
1.	Jon Duckett, “HTML & CSS Design and Build Websites”, Wiley, 2011.
2.	Jon Duckett, “JavaScript and Jquery: Interactive Front-End Web Development”, Wiley,2014.
3.	Holdener, “Ajax: The Definitive Guide”, Oreilly, 2010.
4.	http://cfg.cit.cornell.edu/cfg/design/contents.html

*SDG 9 – Industry Innovation and Infrastructure

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to UI Design and Client side scripting**	
1.1	Introduction-The process of UI design	1
1.2	Elements	1
1.3	Good Vs Bad UI	1
1.4	Web Design issues	1
1.5	HTML	1
1.6	XHTML	1
1.7	CSS	1
1.8	JavaScript Basics	1
1.9	Arrays	1
1.10	Functions	1
1.11	JavaScript objects	1
1.12	HTML DOM -DOM methods	1
1.13	Events-Regular Expressions	1
1.14	Form Validation-JSON-Jquery	1
2.0	**Web applications and Client-Server Communications**	
2.1	Web applications-Web Application Frameworks	1
2.2	MVC framework	1
2.3	Angular JS	1
2.4	Single Page Applications	1
2.5	Responsive Web Design	1
2.6	HTTP-Request/Response Model	1
2.7	HTTP Methods	1
2.8	RESTful APIs	1
2.9	AJAX - AJAX with JSON	1
3.0	**Webservers**	
3.1	Node.js	1
3.2	NPM	1
3.3	Callbacks	1
3.4	Events	1
3.5	Express framework	1
3.6	Cookies	1
3.7	Sessions - Scaling	1
4.0	**Storage**	
4.1	MongoDB	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.2	Manipulating and Accessing MongoDB Documents from Node JS	3
4.3	Applications using MongoDB and Node JS	3
5.0	**Reactive Frameworks**	
5.1	Meteor JS framework	1
5.2	Templates	1
5.3	Decision trees	1
5.4	Events	1
5.5.	Sessions	1
5.6.	Publish & Subscribe - Accounts	2

Course Designer(s)

1. Mr. R.Baskar -baskar@ksrct.ac.in

60 CS E24	Parallel and Distributed Computing	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the need and fundamentals of parallel computing paradigms
- To learn the nuances of parallel algorithm design
- To understand the programming principles in parallel computing architectures
- To learn few problems that are solved using parallel algorithms
- To learn fault tolerant techniques and various algorithms

Pre-requisites

- Operating Systems

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understanding the requirements of Parallel Computing	Understand
CO2	Apply the knowledge of different types of methodologies like mapping techniques	Apply
CO3	Understand the concept of message passing and shared address space	Understand
CO4	Apply the concepts of distributed computing paradigm with applications	Apply
CO5	Relate fault tolerant techniques	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	-	1	-	-	-	-	-	-	2	-	3	-
CO2	2	1	3	3	2	-	-	-	-	-	-	1	-	3	-
CO3	2	3	1	3	3	-	-	-	-	-	-	1	-	3	-

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO4	3	3	2	-	-	-	-	-	-	-	1	2	-	3	-
CO5	2	3	3	2	1	-	-	-	-	-	-	1	-	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	30
Understand	20	20	30
Apply	30	30	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E - Computer Science and Engineering

60 CS E24-Parallel and Distributed Computing

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

INTRODUCTION TO PARALLEL COMPUTING* Scope of Parallel Computing – Parallel Programming Platforms – Implicit Parallelism – Limitations of Memory System Performance – Control Structure of Parallel Platforms – Communication Model of Parallel Platforms –Physical Organization of Parallel Platforms – Communication Costs in Parallel Machines – Impact of Process -Processor Mapping and Mapping Techniques.	[9]
PARALLEL ALGORITHM DESIGN* Preliminaries – Decomposition Techniques – Characteristics of Tasks and Interactions – Mapping Techniques for Load Balancing – Methods for Containing Interaction Overheads – Parallel Algorithm Models – Basic Communication Operations – One-to-All Broadcast and All-to-One Reduction – All-to-All Broadcast and Reduction – All-Reduce and Prefix Sum Operations – Scatter and Gather – All-to-All Personalized Communication- Circular Shift – Improving the Speed of some Communication Operations.	[9]

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

PROGRAMMING USING MESSAGE PASSING AND SHARED ADDRESS SPACE* Principles of Message Passing Programming – Building Blocks – Send and Receive Operations – MPI – Message Passing Interface – Topologies and Embedding – Overlapping Communication with Computation – Collective Communication and Computation Operations – Groups and Communicators – POSIX thread API – OpenMP: a Standard for Directive based Parallel Programming – Applications of Parallel Programming - Matrix-Matrix Multiplication – Solving Systems of Equations – Sorting Networks - Bubble Sort Variations – Parallel Depth First Search.	[9]
DISTRIBUTED COMPUTING PARADIGM* Paradigms for Distributed applications – Basic algorithms in Message passing Systems – Leader Election in Rings – Mutual Exclusion in Shared Memory.	[9]
FAULT TOLERANT DESIGN* Synchronous Systems with Crash Failures – Byzantine Failures – Impossibility in Asynchronous Systems - Formal Model for Simulation – Broadcast and Multicast – Specification of a Broadcast Service – Implementing a Broadcast Service – Multicast in Groups – Distributed Shared Memory – Linearizable – Sequentially Consistent Shared Memory – Algorithms.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Ananth Grama, Anshul Gupta, George Karypis and Vipin Kumar, “Introduction to Parallel Computing”, Second Edition, Pearson Education, 2009.
2.	Haggit Attiya and Jennifer Welch, “Distributed Computing – Fundamentals, Simulations and Advanced Topics”, Second Edition, Wiley, 2012.
Reference(s):	
1.	Michael Quinn, “Parallel Computing - Theory and Practice”, Second Edition, Tata McGraw Hill, 2002.
2.	Norman Matloff, “Parallel Computing for Data Science – With Examples in R, C++ and CUDA”, Chapman and Hall/CRC, 2015.
3.	Wan Fokkink, “Distributed Algorithms: An Intuitive Approach”, MIT Press, 2013.
4.	M.L. Liu, “Distributed Computing – Principles and Applications”, First Edition, Pearson Education, 2011.

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**INTRODUCTION TO PARALLEL COMPUTING**	
1.1	Scope of Parallel Computing – Parallel Programming Platforms	1
1.2	Implicit Parallelism – Limitations of Memory System Performance	2
1.3	Control Structure of Parallel Platforms	1
1.4	Communication Model of Parallel Platforms	1
1.5	Physical Organization of Parallel Platforms	1
1.6	Communication Costs in Parallel Machines	1
1.7	Impact of Process	1
1.8	Processor Mapping and Mapping Techniques	1
2.0	**PARALLEL ALGORITHM DESIGN**	

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.1	Preliminaries – Decomposition Techniques	1
2.2	Characteristics of Tasks and Interactions – Mapping Techniques for Load Balancing	1
2.3	Methods for Containing Interaction Overheads	1
2.4	Parallel Algorithm Models	1
2.5	Basic Communication Operations	1
2.6	One-to-All Broadcast and All-to-One Reduction – All-to-All Broadcast and Reduction	1
2.7	All-Reduce and Prefix Sum Operations – Scatter and Gather	1
2.8	All-to-All Personalized Communication- Circular Shift	1
2.9	Improving the Speed of some Communication Operations	1
3.0	**PROGRAMMING USING MESSAGE PASSING AND SHARED ADDRESS SPACE**	
3.1	Principles of Message Passing Programming – Building Blocks	1
3.2	Send and Receive Operations – MPI	1
3.3	Message Passing Interface – Topologies and Embedding	1
3.4	Overlapping Communication with Computation	1
3.5	Collective Communication and Computation Operations	1
3.6	Groups and Communicators – POSIX thread API	1
3.7	OpenMP: a Standard for Directive based Parallel Programming	1
3.8	Applications of Parallel Programming - Matrix-Matrix Multiplication – Solving Systems of Equations	1
3.9	Sorting Networks - Bubble Sort Variations – Parallel Depth First Search	1
4.0	**DISTRIBUTED COMPUTING PARADIGM**	
4.1	Paradigms for Distributed applications	2
4.2	Basic algorithms in Message passing Systems	3
4.3	Leader Election in Rings	2
4.4	Mutual Exclusion in Shared Memory	2
5.0	**FAULT TOLERANT DESIGN**	
5.1	Synchronous Systems with Crash Failures - Byzantine Failures	2
5.2	Impossibility in Asynchronous Systems	1
5.3	Formal Model for Simulation	1
5.4	Explanation based learning	1
5.5	Broadcast and Multicast	1
5.6	Specification of a Broadcast Service – Implementing a Broadcast Service	1
5.7	Multicast in Groups – Distributed Shared Memory	1
5.8.	Linearizable – Sequentially Consistent Shared Memory – Algorithms	1

Course Designer(s)

1. Dr. K. Poongodi - poongodik@ksrct.ac.in

60 CS E25	Cyber Forensics and Malware	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

- To understand the responsibilities related to Computer Crime and Cyber Crime
- To define and cite suitable scenarios for applying computer forensics
- To identify the methodology of Memory Forensics and its tools
- To acquire an understanding of conducting Malware analysis
- To comprehending the operation and actions of malicious software, as well as a selection for analysing malware

of tools

Pre-requisites

- Operating Systems Knowledge and Networking Fundamentals

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Gain valuable lessons from significant cybercrime incidents, leveraging past experiences to shape proactive prevention and response approaches for the future	Understand
CO2	Demonstrate a deep understanding of the fundamental concepts and practices of computer forensics	Apply
CO3	Apply various forensic tools and techniques to collect, preserve, and analyse digital evidence related to cyber crimes	Apply
CO4	Recognize and categorize various forms of malware	Apply
CO5	Devise effective strategies for detecting, preventing, and mitigating malware threats	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2				3	3				3	3		
CO2	3	3	2				3	3		2		3	3		
CO3	3	3	2				3	3		2		3	3		
CO4	3	3	2				3	3		2		3	3		
CO5	3	3	2				3	3				3	3		

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	20	20	30
Apply	30	30	40
Analyse	-	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E - Computer Science and Engineering							
60 CS E25 – Cyber Forensics and Malware							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

CYBER CRIME AND COMPUTER CRIME* Introduction to Digital Forensics, Definition and types of cybercrimes, electronic evidence and handling, electronic media, collection, searching and storage of electronic media, introduction to internet crimes, hacking and cracking, credit card and ATM frauds, web technology, cryptography, emerging digital crimes and modules.	[9]
COMPUTER FORENSICS* Definition and Cardinal Rules, Data Acquisition and Authentication Process, Windows Systems-FAT12, FAT16, FAT32 and NTFS, UNIX file Systems, mac file systems, computer artifacts, Internet Artifacts, OS Artifacts and their forensic applications.	[9]
MEMORY FORENSICS AND FORENSIC TOOLS* History of Memory Forensics, x86/x64 architecture, Data structures, Volatility Framework & plugins Memory acquisition, File Formats – PE/ELF/Mach-O, Processes and process injection. Introduction to Forensic Tools, Usage of Slack space, tools for Disk Imaging, Data Recovery, retrieving information, process of computer forensics and digital investigations, processing of digital evidence, digital images, damaged SIM and data recovery, multimedia evidence.	[9]
MALWARE AND VIRTUAL SANDBOX* Basic Static Techniques, Malware Analysis in Virtual Machines, Basic Dynamic Analysis, Malware Analysis - VM infra creation for Malware Analysis. Virtualization, virtual box, sandbox network infrastructure, integrating virus total signature with VM, Using a Malware Sandbox.	[9]
MALWARE CLASSIFICATION AND CLUSTERING* Evaluation of Automated Malware Analysis system - Evaluation of Automated Malware Analysis Tools. The Quick-and-Dirty Approach, Using a Malware Sandbox, Monitoring with Process Monitor.	[9]
Total Hours:	**45**
Text Book(s):	

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.	Altheide C & Carvey H, “Digital Forensics with Open-Source Tools”, Syngress, 2011. ISBN: 9781597495868
2.	Michael Sikorski and Andrew Honig, “Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software”, 1st Edition, No Starch Press, 2012.
Reference(s):	
1.	Christopher Elisan, “Advanced Malware Analysis”, first edition, McGraw-Hill Education, 2015.
2.	Marie-Helen Maras**, “Computer Forensics: Cybercriminals, Laws, and Evidence”,** 2014.

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**CYBER CRIME AND COMPUTER CRIME**	
1.1	Digital Forensics, Definition and types of cybercrimes	1
1.2	Electronic evidence and handling, electronic media	1
1.3	Collection, searching and storage of electronic media	1
1.4	Internet crimes	1
1.5	Hacking and cracking	1
1.6	ATM Card Frauds	1
1.7	Web Technology	1
1.8	Cryptography	1
1.9	Emerging digital crimes and modules	1
2.0	**COMPUTER FORENSICS**	
2.1	Definition and Cardinal Rules	1
2.2	Data Acquisition	1
2.3	Authentication Process,	1
2.4	Windows Systems-FAT12, FAT16, FAT32	1
2.5	NTFS	1
2.6	UNIX file Systems,	1
2.7	MAC file systems	1
2.8	Computer artifacts and Internet Artifacts	1
2.9	OS Artifacts and their forensic applications	1
3.0	**MEMORY FORENSICS AND FORENSIC TOOLS**	
3.1	History of Memory Forensics	1
3.2	x86/x64 architecture and its data structures	1
3.3	Volatility Framework & plugins Memory acquisition,	1
3.4	File Formats – PE/ELF/Mach-O, Processes and process injection.	1
3.5	Introduction to Forensic Tools, Usage of Slack space	1
3.6	Tools for Disk Imaging, Data Recovery, retrieving information	1
3.7	Process of computer	1
3.8	Forensics and digital investigations	1

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.9	Processing of digital evidence, digital images	1
3.10	Damaged SIM and data recovery, multimedia evidence	1
4.0	**MALWARE AND VIRTUAL SANDBOX**	
4.1	Basic Static Techniques	1
4.2	Malware Analysis in Virtual Machines & Dynamic Analysis	1
4.3	Malware Analysis	1
4.4	VM infra creation for Malware Analysis.	1
4.5	Virtualization, virtual box, sandbox network infrastructure,	1
4.6	Integrating with malware like virus	2
4.7	Total signature with VM	1
4.8	Using a Malware Sandbox	1
5.0	**MALWARE CLASSIFICATION AND CLUSTERING**	
5.1	Automated Malware Analysis system - Introduction	1
5.2	Automated Malware Analysis Tools.	1
5.3	The Quick-and-Dirty Approach,	1
5.4	Case Study	1
5.5	Implementation	1
5.6	Automated demo with malware protection	1
5.7	Monitoring with Process Monitor	1
5.8	Implementation Process	1

Course Designer(s)

1. Mr. S. Rajkumar – rajkumars@ksrct.ac.in

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60 CS E26	C# and .NET Core	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To gain the fundamental skills in C# programming Language
- To gain knowledge in object-oriented concepts in C#
- To understand the concepts of the .NET Core and its platform
- To implement data manipulation using Razor pages
- To enhance the knowledge in Model-View-Controller architecture

Pre-requisites

- Object Oriented Programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic concepts of C#	Understand
CO2	Apply the Object-Oriented concepts in C# for problem solving	Apply
CO3	Develop web pages using ASP.NET Core platform	Apply
CO4	Implement the data manipulation concept using Razor Pages	Apply
CO5	Integrate the concept of MVC in ASP.NET Core platform	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	2	-	-	-	-	1	-	3	2	-	-
CO2	3	3	-	-	2	-	-	-	-	2	-	1	3	-	-
CO3	3	3	-	3	2	-	-	-	-	3	-	3	3	-	-
CO4	3	2	2	-	2	-	-	-	-	3	-	3	3	-	-
CO5	3	3	-	3	2	-	-	-	-	3	-	3	3	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	10	-
Understand	15	-	15	-	-	30	-
Apply	35	100	35	100	100	60	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-

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Passed in BoS Meeting held on 24/05/2024
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CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E26 – C# and .NET Core								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	2	0	2	60	3	50	50	100

Introduction to C#: Introducing C# – Understanding .NET – Overview of C# – Literals – Variables – Data Types – Operators –Expressions – Branching – Looping – Methods – Arrays – Strings – Structures – Enumerations.	[6]
Object-Oriented Programming in C#: Classes–Objects –Inheritance– Methods –Polymorphism –Interfaces –Operator Overloading – Delegates –Events–Errors–Exceptions–Collections–Managing File system.	[6]
ASP.NET Core Web Application using Razor Pages:* Introduction to ASP.NET Core Web Application – Environment Setup – Project Layout – Static and Default Files - Enabling and Defining Razor Pages – Shared Layouts – Using code-behind files.	[6]
Data Manipulation using Razor Pages:* Introduction to ADO.NET-Database connectivity concept using ADO.NET – Connection Class with Authentication – Command Class – DataReader Class –DataAdapter Class – DataSet – OnGet –OnPost – OnPostDelete – OnPostEdit – OnPostView – REST API – Model and Controller for REST API.	[6]
Model-View-Controller (MVC) in ASP.NET Core:* Introduction to MVC – Setting up an ASP.NET Core MVC Website – MVC Routing – Controllers and Actions –Model – Views – Parameters Passing – View Helpers – Model Validation.	[6]
Practical: 1. Develop simple application using C#. 2. Implement inheritance and Operator overloading using C#. 3. Design an ASP.NET Webpage to work with Dropdown list and ListBox controls. 4. Write a C# programs to demonstrate the concepts of Label, Text Box and Button controls. 5. Create a ADO.NET application in C# to verify if the connection is established with OLEDB and MS-ACCESS. 6. Create a ADO.NET applications in C# to demonstrate the Data Reader, Data Set, Data Adapter and Data View Objects 7. Develop a Registration Form with all Validation Controls 8. Create a Web Service for all Arithmetic operations	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**
Text Book(s):	
1. Mark J. Price, “C# 8.0 and .NET Core 3.0 – Modern Cross-Platform Development”, 4th Edition, Packt Publishing Limited, 2019.	

Rev. No.4/w.e.f. 01.06.2024

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Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	Dino Esposito, “Programming ASP.NET Core”, 1st Edition, Pearson Education Inc., 2018.
Reference(s):	
1.	https://docs.microsoft.com/en-us/aspnet/core/
2.	Christian Nagel, “Professional C# 7 and .NET Core 2.0”, 1st Edition, Wiley Publication, 2018.
3.	Andrew Troelsen Phil Japikse,” Pro C# 8 with .NET Core 3: Foundational Principles and Practices in Programming”, Apress, 2020.
4.	Jon Skeet,” C# in Depth”,Fourth Edition, 2019.

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction to C#**	
1.1	Introducing C# – Understanding .NET	1
1.2	Overview of C# – Literals	1
1.3	Variables – Data Types – Operators –Expressions	1
1.4	Branching – Looping	1
1.5	Methods – Arrays - Strings	1
1.6	Structures – Enumerations	1
2	**Object-Oriented Programming in C#**	
2.1	Object-Oriented Programming in C# -Classes – Objects	1
2.2	Inheritance - Methods	1
2.3	Polymorphism – Interfaces - Operator Overloading	1
2.4	Delegates –Events	1
2.5	Errors – Exceptions – Collections	1
2.6	Managing File system	1
3	**ASP.NET Core Web Application using Razor Pages**	
3.1	Introduction to ASP.NET Core Web Application	1
3.2	Environment Setup	1
3.3	Project Layout	1
3.4	Static and Default Files	1
3.5	Enabling and Defining Razor Pages	1
3.6	Shared Layouts - Shared Layouts Using code-Managing File system	1
4	**Data Manipulation using Razor Pages**	
4.1	Introduction to ADO.NET	1
4.2	Database connectivity concept using ADO.NET	1
4.3	Connection Class with Authentication - Command Class	1
4.4	DataReader Class - DataAdapter Class - DataSet	1

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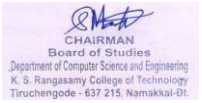
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.5	OnGet –OnPost – OnPostDelete - OnPostEdit – OnPostView	1
4.6	REST API –Model and Controller for REST API	1
5	**Electric and Autonomous Vehicles**	
5.1	Introduction to MVC	1
5.2	Setting up an ASP.NET Core MVC Website	1
5.3	MVC Routing - Controllers and Actions	1
5.4	Model – Views - Parameters Passing	1
5.5	View Helpers	1
5.6	Model Validation.	1
Practical:		
1.	Develop simple application using C#	2
2.	Implement inheritance and Operator overloading using C#	4
3.	Design an ASP.NET Webpage to work with Dropdown list and ListBox controls	4
4.	Write a C# programs to demonstrate the concepts of Label, Text Box and Button controls	4
5.	Create a ADO.NET application in C# to verify if the connection is established with OLEDB and MS-ACCESS	4
6.	Create a ADO.NET applications in C# to demonstrate the Data Reader, Data Set, Data Adapter and Data View Objects	4
7.	Develop a Registration Form with all Validation Controls	4
8.	Create a Web Service for all Arithmetic operations	4

Course Designer(s)

1. Mr.K. Dineshkumar - dineshkumark@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024



60 CS E27	Advanced Java	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To enable the students to learn Java Collections Framework.
- To understand the Collections Utility and Concurrent Collections in Java.
- To create and use Spring Framework and Enterprise JavaBeans (EJB).
- To understand Java 8 Features.
- To understand Web Services and Design Patterns.

Pre-requisites

Basics of Java

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the principles of Java Collections Framework	Understand
CO2	Implement Collections Utility and Concurrent Collections in Java	Apply
CO3	Create and use Spring Framework and Enterprise JavaBeans (EJB)	Apply
CO4	Analyzing the Java 8 Features	Analyse
CO5	Implement the concept of Web Services and Design Patterns	Apply

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	3	-	-	-	3	3	2	3	2	-	-
CO2	3	3	3	-	3	2	-	2	3	3	2	3	3	2	-
CO3	2	3	3	-	3	-	-	2	3	3	2	3	3	2	-
CO4	3	3	3	2	3	2	-	-	3	3	2	3	3	2	-
CO5	2	3	3	2	3	2	-	-	3	3	2	3	3	-	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	20	20	30
Apply	30	20	40
Analyse	-	10	20
Evaluate	-	-	-

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
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CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E - Computer Science Engineering								
60 CS E27 - Advanced Java								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Java Collections Framework* Introduction to Collections, Overview of the Java Collections Framework (JCF), Importance of collections in Java programming, Core Interfaces- List, Set, and Map interfaces, hierarchy of collection interfaces, Lists and their Implementations - ArrayList and LinkedList, Sets and their Implementations - HashSet, LinkedHashSet, and TreeSet, Maps and their Implementations- HashMap, LinkedHashMap, and TreeMap, Key-value pairs, ordering, and special features.	[9]
Collections Utility and Concurrent Collections* Common utility methods- Sorting, searching, and synchronization, Custom Objects in Collections- Implementing Comparable and Comparator interfaces, customizing sorting for user-defined classes, Concurrent Collections - ConcurrentHashMap and CopyOnWriteArrayList, Collections Best Practices - Guidelines for choosing the right collection, Performance considerations and best coding practices.	[9]
Spring Framework and Enterprise JavaBeans (EJB)* Overview of the Spring framework - Dependency injection and Inversion of Control (IoC), Spring MVC - Building web applications, Controllers, views, and forms, Spring Data and Hibernate Integration, Integrating Spring with Hibernate, Spring Data. Introduction to EJB - Session beans, entity beans, and message-driven beans, EJB 3.x Features - Annotations and simplifications.	[9]
Java 8 Features* Lambda expressions, Method references, Functional interfaces, Stream API, Default methods, Base64 Encode Decode, Static methods in interface, Optional class, Collectors class, ForEach() method, Nashorn JavaScript Engine, Parallel Array Sorting, Type and Repeating Annotations, IO Enhancements, Concurrency Enhancements, JDBC Enhancements.	[9]

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Web Services and Design Patterns* Web Services - SOAP and RESTful web services, JAX-RS and JAX-WS for Java web services. Design Patterns in Java - Overview of Design Patterns – Categories, Creational Design Patterns - Singleton, Factory, Builder, Prototype. Structural Design Patterns – Adapter, Bridge, Composite, Decorator. Behavioral Design Patterns – Observer, Strategy, Command. Additional Design Patterns and Best Practices - Chain of Responsibility Pattern, Visitor and Template Method patterns.	[9]
Total Hours:	**45**
Text Book(s):	
1. Uttam Kumar Roy, “Advanced Java Programming”, UK Edition, OUP India, 2015.	
2. Nageswara Rao R, DT Editorial Services, “Core Java: An Integrated Approach”, Dreamtech Press, 1st Edition, 2016.	
Reference(s) :	
1. Anuradha A. Puntambekar, “Advanced Java”, Technical Publications, 2020.	

* SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Java Collections Framework**	
1.1	Introduction to Collections, Overview of the Java Collections Framework (JCF), Importance of collections in Java programming, Core Interfaces	2
1.2	List, Set, and Map interfaces, hierarchy of collection interfaces, Lists and their Implementations	2
1.3	ArrayList and LinkedList, Sets and their Implementations	1
1.4	HashSet, LinkedHashSet, and TreeSet, Maps and their Implementations	2
1.5	HashMap, LinkedHashMap, and TreeMap, Key	1
1.6	value pairs, ordering, and special features	1
2.0	**Collections Utility and Concurrent Collections**	
2.1	Common utility methods	2
2.2	Sorting, searching, and synchronization, Custom Objects in Collections	2
2.3	Implementing Comparable and Comparator interfaces, customizing sorting for user-defined classes, Concurrent Collections	2
2.4	Concurrent HashMap and Copy On Write Array List, Collections Best Practices	2
2.5	Guidelines for choosing the right collection, Performance considerations and best coding practices.	1
3.0	**Spring Framework and Enterprise JavaBeans (EJB)**	
3.1	Overview of the Spring framework	1
3.2	Dependency injection and Inversion of Control (IoC), Spring MVC	2

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.3	Building web applications, Controllers, views, and forms, Spring Data and Hibernate Integration, Integrating Spring with Hibernate, Spring Data. Introduction to EJB	2
3.4	Session beans, entity beans, and message-driven beans, EJB 3.x Features	2
3.5	Annotations and simplifications	2
4.0	**Java 8 Features**	
4.1	Lambda expressions, Method references, Functional interfaces	2
4.2	Stream API, Default methods, Base64 Encode Decode	2
4.3	Static methods in interface, Optional class, Collectors class	1
4.4	ForEach() method, Nashorn JavaScript Engine, Parallel Array Sorting	1
4.5	Type and Repeating Annotations, IO Enhancements	2
4.6	Concurrency Enhancements, JDBC Enhancements	1
5.0	**Web Services and Design Patterns**	
5.1	Web Services	1
5.2	SOAP and RESTful web services, JAX-RS and JAX-WS for Java web services. Design Patterns in Java	1
5.3	Overview of Design Patterns – Categories, Creational Design Patterns	2
5.4	Singleton, Factory, Builder, Prototype. Structural Design Patterns	1
5.5	Adapter, Bridge, Composite, Decorator. Behavioral Design Patterns	1
5.6	Observer, Strategy, Command. Additional Design Patterns and Best Practices	1
5.7	Chain of Responsibility Pattern, Visitor and Template Method patterns	2

Course Designer(s)

1. S Vadivel - vadivels@ksrct.ac.in

60 CS E31	Prompt Engineering	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To know the concept of prompt engineering with ChatGPT
- To understand the limitations of prompt engineering
- To write powerful prompts
- To explain the quality control and testing of existing prompts
- To automate prompt engineering solutions

Pre-requisites

- Artificial Intelligence and NLP

Course Outcomes

On the successful completion of the course, students will be able to

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Tiruchengode - 637 215, Namakkal-Dt.

CO1	Recognize the concept of prompt engineering with ChatGPT.	Understand
CO2	Analyse the limitations of prompt solutions.	Analyse
CO3	Apply the techniques to write powerful prompts.	Apply
CO4	Evaluate and refine the existing prompt solutions.	Apply
CO5	Use automated techniques to develop prompt solutions.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	2	3	-	-	-	2	2	-	2	3	2	-
CO2	3	3	3	2	3	-	-	-	2	2	-	2	3	2	-
CO3	3	3	3	2	3	-	-	-	2	2	-	2	3	2	-
CO4	3	3	3	2	3	-	-	-	2	2	-	2	3	2	-
CO5	3	3	3	2	3	-	-	-	2	2	-	2	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	30	30
Apply	20	20	30
Analyse	10	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E - Computer Science and Engineering							
60 CS E31- Prompt Engineering							
Semester	Hours/Week			Total Hours	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

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CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215. Namakkal-Dt.

Introduction to Prompt Engineering With ChatGPT Introduction to natural language processing (NLP) and prompt engineering - Prompt engineering application in ChatGPT - Understanding the benefits and challenges of prompt engineering - Real-world examples of prompt engineering in action	[9]
Understanding the Limits of Prompt Engineering Recognizing when using prompt solutions is not appropriate - Identifying the limitations of prompt solutions Activity: Analyzing the limitations of prompt solutions	[9]
Writing Powerful Prompts Introduction to task-specific prompts - Techniques for creating powerful, task-specific prompts - Best practices for writing effective prompts - Exercise in writing prompts	[9]
Quality Control & Testing of Existing Prompts Understanding the importance of evaluating and testing existing prompt solutions - Techniques for evaluating and testing prompt solutions - Best practices for refining existing prompt solutions or developing new ones Activity: Evaluating and refining existing prompt solutions	[9]
Automating Prompt Engineering Solutions Overview of automated techniques used in prompt engineering for ChatGPT - Benefits and limitations of automated prompt engineering for ChatGPT - Best practices for using automated techniques in developing efficient, effective, and quality-controlled prompt solutions Activity: Using automated techniques to develop prompt solutions **Ethical Considerations in Prompt Engineering** Understanding the ethical considerations and potential biases in prompt engineering – Best practices for ensuring fairness and accountability in prompt engineering – Discussion in analyzing ethical considerations in prompt engineering for ChatGPT	[9]
Total Hours:	**45**

Text Book(s):	
1.	James Phoenix, Mike Taylor, “Prompt Engineering for Generative AI”, O'Reilly Media, Inc.,2024.
2.	John Berryman, Albert Ziegler, “Prompt Engineering for LLMs”, O'Reilly Media, Inc., 2024.
Reference(s):	
1.	PADMARAJ NIDAGUNDI, “Prompt Engineering: A Handbook for Prompt Engineering, NLP Engineers, Software developers, AI Tech leaders, Startup business owners and Other IT Professionals”, Kindle Edition, 2022.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction To Prompt Engineering With ChatGPT**	
1.1	Introduction to natural language processing (NLP) and prompt engineering	2
1.2	Prompt engineering application in ChatGPT	2
1.3	Understanding the benefits and challenges of prompt engineering	2
1.4	Real-world examples of prompt engineering in action	3
2.0	**Understanding The Limits Of Prompt Engineering**	
2.1	Recognizing when using prompt solutions is not appropriate	3
2.2	Identifying the limitations of prompt solutions	3
2.3	Activity: Analyzing the limitations of prompt solutions	3

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.0	**Writing Powerful Prompts**	
3.1	Introduction to task-specific prompts	2
3.2	Techniques for creating powerful, task-specific prompts	2
3.3	Best practices for writing effective prompts	3
3.4	Exercise in writing prompts	2
4.0	**Quality Control & Testing of Existing Prompts**	
4.1	Understanding the importance of evaluating and testing existing prompt solution	3
4.2	Techniques for evaluating and testing prompt solutions	2
4.3	Best practices for refining existing prompt solutions or developing new ones	2
4.4	Activity: Evaluating and refining existing prompt solutions	2
5.0	**Automating Prompt Engineering Solutions**	
5.1	Overview of automated techniques used in prompt engineering for ChatGPT	1
5.2	Benefits and limitations of automated prompt engineering for ChatGPT	1
5.3	Best practices for using automated techniques in developing efficient, effective, and quality-controlled prompt solutions	1
5.4	Activity: Using automated techniques to develop prompt solutions	2
5.5	**Ethical Considerations in Prompt Engineering** Understanding the ethical considerations and potential biases in prompt engineering	2
5.6	Best practices for ensuring fairness and accountability in prompt engineering	1
5.7	Discussion in analyzing ethical considerations in prompt engineering for ChatGPT	1

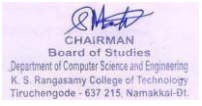
Course Designer(s)

1. Dr.K. Poongodi - poongodik@ksrct.ac.in

60 CS E32	Full Stack Development	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- Enable the students to understand the design of Web Page Development concepts and scripting languages. • To learn the knowledge of Angular framework and apply in the real world.
- To update and enhance skills in writing C#.NET framework and apply web services in real time environment
- To familiarize and update the students with various data models and SQL functions to apply in real world



- To providing students with hands on experience and enhancing problem solving skills in writing web-based applications on .NET

Pre-requisites

- Web Development

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recall the concepts of HTML, CSS, JavaScript and express the features of scripting language.	Apply
CO2	Gain knowledge of Angular framework and apply in the real world	Apply
CO3	Design and apply the knowledge of data binding to create Web forms and obtain knowledge of Web services	Apply
CO4	Express the knowledge of data models and apply the various sequence and functions	Apply
CO5	Ability to develop web pages using ASP.NET Core platform	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	2	-	-	-	-	-	-	2	-	-	-
CO2	3	3	2	2	2	-	-	-	-	-	-	2	-	3	-
CO3	3	2	2	2	2	2	-	-	-	-	-	2	-	3	-
CO4	3	2	2	2	2	2	-	-	-	-	-	3	-	3	-
CO5	3	3	2	2	2	-	-	-	-	-	-	3	-	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	10	-
Understand	15	-	15	-	-	40	-
Apply	35	100	35	100	100	50	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E - Computer Science and Engineering								
60 CS E32 – Full Stack Development								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	2	0	2	60	3	50	50	100

Introduction to Front End Development* Overview of Front-End Development - HTML - CSS - JavaScript - Typescript - Bootstrap – Design Webpage using this technology	[6]
Angular* Npm - Visual Code Installation - Life Cycle - Binding - Building Block - Component, Pipe, Module, Service, Directive, Routing Dependency Injection, JSON - Forms - Template and Reactive Forms - RXJX - API client, API request and API response, Simple Angular Application.	[6]
Middle Layer- WebAPI* Overview - Installing Visual Studio - XML - SOAP service vs RESTful services - HTTP Verbs, Develop API on - Get, Post, Patch, Delete - IIS Overview - Hosting in IIS - API testing using PostMan - Simple API with JSON file.	[6]
Back End Development* PL/SQL - DDL/DML -Basic Syntax - Data Types – Queries, JSON formation in the Backend, SQL Injection, and Simple PL/SQL Application.	[6]
Case study* Shopping APP- Login/Signup Page - Credentials - Enable Multi-factor Authentication - List the Product - Add to Cart - Select and Confirm the Order - Payment Gateway - Send Notification after Order Confirmation - Logout	[6]
Practical: 1. HTML Structure and Tags: Hands-on practice building a basic webpage using HTML elements like headers, paragraphs, images, and lists. 2. CSS Styling: Apply CSS selectors, properties, and values to style the webpage from focusing on visual appeal and layout. 3. Interactive JavaScript: Introduce interactivity by incorporating JavaScript events and functions (e.g., button clicks, form submissions) to the webpage. 4. Bootstrap Integration: Enhance the webpage's layout and responsiveness using Bootstrap components like grids, navigation bars, and cards. 5. Building a Simple Angular Application: Create a basic Angular application with components, templates, and data binding to solidify core concepts. 6. Angular: Create user registration form using reactive or template form with validation 7. Component Communication: Implement communication between components using Input and Output decorators, enabling data exchange within the application. 8. HTTP Services: Construct an Angular application that fetches data from an API using HTTP services, familiarizing students with data retrieval techniques. 9. create Web API using HTTP verb and Deploying Web server. 10. PL/SQL Procedures and Functions: Write PL/SQL procedures and functions to perform data manipulation tasks in an Oracle database, fostering practical database programming skills.	[30]
Total Hours: (Lecture - 30; Practical - 30)	60
Text Book(s):	

1.	H.M.Deitel, P.J.Deitel, A.B.Goldberg, “INTERNET and WORLD WIDE WEB – How to program”, Pearson education, Third Edition, 2004

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	E. Balagurusamy, “Programming in C#”, 4th Edition, Tata McGraw-Hill, 2017.
3.	Ken Williamson,” Learning AngularJS: A Guide to AngularJS Development”, O' Reilly,2015
4.	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Seventh Edition, McGraw Hill, 2020.
Reference(s):	
1.	Eric Ladd and Jim O’Donnell, et al, “USING HTML 4, XML, and JAVA1.2”, PHI publications, 2003.
2.	Doguhan Uluca,” Angular 6 for Enterprise-Ready Web Applications: Deliver production-ready and cloudscale Angular web apps”,kindle Edition,2018
3.	Herbert Schildt, “The Complete Reference: C# 4.0”, Tata McGraw Hill, 2012
4.	C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition,Pearson Education, 2006.

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Overview of Front-End Development**	
1.1	HTML	1
1.2	CSS	1
1.3	JavaScript	1
1.4	Typescript	1
1.5	Bootstrap – Design Web page using this technology	2
2.0	**Angular**	
2.1	Npm - Visual Code Installation - Life Cycle - Binding - Building Block	1
2.2	Component, Pipe, Module, Service	1
2.3	Directive, Routing, Dependency Injection, JSON	1
2.4	Forms - Template and Reactive Forms	1
2.5	API client, API request and API response	1
2.6	Design Simple Angular Application.	1
3.0	**Middle Layer- WebAPI**	
3.1	Overview - Installing Visual Studio	1
3.2	XML - SOAP service vs RESTful services	1
3.3	HTTP Verbs, Develop API on - Get, Post, Patch, Delete	1
3.4	IIS Overview- Hosting in IIS	1
3.5	API testing using PostMan	1
3.6	Simple API with JSON file	1
4.0	**Back End Development**	
4.1	PL/SQL - Data Types	2
4.2	DDL/DML -Basic Syntax- Queries	1
4.3	JSON formation in the Backend	1
4.4	SQL Injection,	1
4.5	Simple PL/SQL Application	1

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.0	**Developing a Web Page-Case Studies**	
5.1	Shopping APP- Login/Signup Page	2
5.2	Credentials - Enable Multi-factor Authentication	1
5.3	Add to Cart - Select and Confirm the Order	1
5.4	Send Notification after Order Confirmation -	1
5.5	Logout page	1
Practical:		
1.	HTML Structure and Tags: Hands-on practice building a basic webpage using HTML elements like headers, paragraphs, images, and lists	3
2.	CSS Styling: Apply CSS selectors, properties, and values to style the webpage from focusing on visual appeal and layout	3
3.	Interactive JavaScript: Introduce interactivity by incorporating JavaScript events and functions (e.g., button clicks, form submissions) to the webpage.	3
4.	Bootstrap Integration: Enhance the webpage's layout and responsiveness using Bootstrap components like grids, navigation bars, and cards	3
5.	Building a Simple Angular Application: Create a basic Angular application with components, templates, and data binding to solidify core concepts	3
6.	Angular: Create user registration form using reactive or template form with validation	3
7.	Component Communication: Implement communication between components using Input and Output decorators, enabling data exchange within the application	3
8.	HTTP Services: Construct an Angular application that fetches data from an API using HTTP services, familiarizing students with data retrieval techniques	3
9.	Create Web API using HTTP verb and Deploying Web server	3
10.	PL/SQL Procedures and Functions: Write PL/SQL procedures and functions to perform data manipulation tasks in an Oracle database, fostering practical database programming skills	3

Course Designer(s)

1. Mr. K. Dineshkumar – dineshkumar@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS E33	Salesforce	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To Understand Salesforce Architecture and Features
- To know the customization process in Salesforce
- To Understand the security model
- To Understand the Sales Cloud and Cloud modules
- To Understand the business process automation options, reports and dashboard

Pre-requisites

 Knowledge on Software Engineering and computer programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply data modeling techniques to design and configure custom objects, fields, and relationships in Salesforce.	Apply
CO2	Apply advanced data management and customization techniques in Salesforce to enhance data organization and user experience	Apply
CO3	Evaluate and recommend appropriate Salesforce user setup and security settings to control access and permissions	Analyze
CO4	Develop advanced automation solutions using Process Builder and Visual Workflow to meet complex business requirements	Apply
CO5	Evaluate and recommend appropriate reporting and analytics strategies based on business requirements.	Evaluate

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO1	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-
CO2	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-
CO3	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-
CO4	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-
CO5	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	10	-
Understand	15	-	10	-	-	20	-
Apply	35	100	10	50	50	40	50
Analyse	-	-	20	50	30	30	50
Evaluate	-	-	10	-	20	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E - Computer Science and Engineering								
60 CS E33 – Salesforce								
Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	2	60	3	50	50	100

Salesforce Fundamentals Introduction to CRM- Overview of Salesforce platform and its Architecture, Salesforce editions and licenses - Salesforce user interface and Salesforce Lightning Experience Signing up Developer Edition , Apps Creation.- Standard Objects - Creating Custom Objects - Fields and data types	[6]
Salesforce Data Management and Customization Essentials* Creating Formula Fields, Data Validation - Validation rules. Working with Record Types and Page Layouts - Compact Layout- Lightning Record Pages - Path Settings. - List Views - Relationships and junction objects, Roll up Summary.	[6]
Security and Data Access* Organization Security Controls - User Setup and Security - User Creation- Security Model: Profile settings and permissions - Permission set- Salesforce Sharing model Organization Wide Defaults (OWD) - Role Hierarchy- Sharing Rules- Manual Sharing - Sharing rules and public groups.	[6]
Business Process Automation Introduction to Flows: Types of Flow: Screen Flow- Record Trigrrered Flow- Scheduled Trigger Flow- Auto Launched Flow. **uses cases of Process Automation. Email Alerts and Field Updates - Approval Processes****.	[6]

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215. Namakkal-Dt.

Reports, Dashboards, and Analytics Creating or customizing a report - Summarizing data, report formats and filtering data, **Report Charts and Dashboard Components, Custom Report Types- Dashboard Creation and Modification **.**	[6]
Practical: 1. Create Objects, Fields and App 2. Explore Data Types 3. Create Field Relationships 4. Create Record Types(create), Page Layout (adding section, field property settings), Page Layout Assignment (assign page layout based on Record types) 5. Create Lightning Record Page, List View, Path Settings 6. Validation Rule 7. **Automation I**** a. Screen Flow b. Auto Launched Flow 8. **Automation II**** a. Record Trigger Flow b. Scheduled Flow c. Approval Process 9. **Security*** a. Profiles and Permission Set b. Org Wide Default c. Roles d. Sharing Rules e. Manual Sharing 10. **Reports and Dashboards**** a. Custom Report Types b. Dynamic Dashboards c. Report and Dashboards Sharing	[30]
Total Hours: (Lecture - 30; Practical - 30)	60
Text Book(s):	
1. Sharif Shaalan, Timothy Royer, “Salesforce for Beginners, A step-by-step guide to optimize sales and marketing and automate business processes with the Salesforce platform”, 2nd Edition, Packt Publishing Limited, 2022.	
2. Sharif Shaalan, “Salesforce for Beginners: A step-by-step guide to creating, managing, and automating sales and marketing processes Paperback – Illustrated”, Packt Publishing Limited, 2020	

***SDG 4 - Quality Education**

****SDG 8 - sustainable economic growth, full and productive employment**

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Salesforce Fundamentals**	
1.1	Introduction to CRM	1
1.2	Overview of Salesforce platform and its Architecture, editions and licenses	1
1.3	Salesforce Lightning Experience, user interface and navigation	1
1.4	Signing up Developer Edition - Apps Creation	1
1.5	Standard Objects	1

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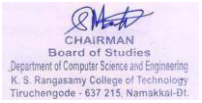
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.6	Creating Custom Objects - Fields and data types	1
2.0	**Salesforce Data Management and Customization Essentials**	
2.1	Creating Formula Fields	1
2.2	Data Validation - Validation rules	1
2.3	Working with Record Types and Page Layouts	1
2.4	Compact Layout- Lightning Record Pages	1
2.5	Path Settings, List Views	1
2.6	Relationships and junction objects, Roll up Summary	1
3.0	**Security and Data Access**	
3.1	Organization Security Controls	1
3.2	User Setup and Security - User Creation	1
3.3	Security Model: Profile settings and permissions, Permission set	1
3.4	Salesforce Sharing model -Organization Wide Defaults (OWD)	1
3.5	Role Hierarchy- Sharing Rules- Manual Sharing	1
3.6	Sharing rules and public groups	1
4.0	**Business Process Automation**	
4.1	Introduction to Flows: Types of Flow	1
4.2	Uses cases of Process Automation -Screen Flow	1
4.3	Record Trigrrered Flow	1
4.4	Scheduled Trigger Flow	1
4.5	Auto Launched Flow	1
4.6	Email Alerts and Field Updates - Approval Processes	1
5.0	**Reports, Dashboards, and Analytics**	
5.1	Creating or customizing a report	1
5.2	Summarizing data, report formats and filtering data	1
5.3	Report Charts and Dashboard Components	1
5.4	custom report types- Summary Report	1
5.5	Tabular Report- matrix Report	
5.6	Dash Boards: Standard DashBoards & Dynamic DashBoards	1
Practical:		
1.	Create Objects, Fields and App	3
2.	Explore Data Types	3
3	Create Field Relationships	3
4	Create Record Types(create), Page Layout (adding section, field property settings), Page Layout Assignment (assign page layout based on Record types)	3
5	Create Lightning Record Page, List View, Path Settings	3
6	Validation Rule	3



7	Automation I* a. Screen Flow b. Auto Launched Flow	3
8	Automation II* a. Record Trigger Flow b. Scheduled Flow Approval Process	3
9	Security* a. Profiles and Permission Set b. Org Wide Default c. Roles d. Sharing Rules e. Manual Sharing	3
10	Reports and Dashboards ** a. Custom Report Types b. Dynamic Dashboards Report and Dashboards Sharing	3

Course Designer(s)

1. Dr. P. Kaladevi -kaladevi@ksrct.ac.in

60 CS E34	Game Design Technologies	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To introduce the student to the notion of a game, its solutions concepts, and other basic notions and tools of game theory, and the main applications for which they are appropriate, including electronic trading markets
- To formalize the notion of strategic thinking and rational choice by using the tools of game theory, and to provide insights into using game theory in modeling applications

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215. Namakkal-Dt.

- To draw the connections between game theory, computer science, and economics, especially emphasizing the computational issues
- To introduce contemporary topics in the intersection of game theory, computer science, and economics

Pre-requisites

- Programming Knowledge

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the notion of a strategic game and equilibria, and identify the characteristics of main applications of these concepts.	Understand
CO2	Understand the applications of Game Theory in Computer Science and Engineering	Understand
CO3	Discuss the use of Nash Equilibrium for other problems.	Apply
CO4	Identify key strategic aspects and based on these be able to connect them to appropriate game theoretic concepts given a real world situation.	Apply
CO5	Implement a typical Virtual Business scenario using Game theory	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	-	-	-	-	-	-	2	-	2	2	-	-
CO2	3	3	2	-	2	-	-	-	-	2	-	2	2	-	-
CO3	3	3	2	-	2	-	2	-	-	2	-	2	2	-	-
CO4	2	2	2	-	-	-	-	-	-	2	-	2	2	-	-
CO5	3	2	2	-	-	-	2	-	-	2	-	2	2	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	50	30	40
Apply	-	20	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E - Computer Science and Engineering								
60 CS E34 – Game Design Technologies								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

INTRODUCTION* Introduction – Making rational choices: basics of Games – strategy - preferences – payoffs – Mathematical basics - Game theory – Rational Choice - Basic solution concepts-non cooperative versus cooperative games - Basic computational issues - finding equilibria and learning in games- Typical application areas for game theory (e.g. Google's sponsored search, eBay auctions, electricity trading markets).	[9]
GAMES WITH PERFECT INFORMATION * Games with Perfect Information - Strategic games - prisoner's dilemma, matching pennies Nash equilibria- theory and illustrations - Cournot's and Bertrand's models of oligopoly- auctions mixed strategy equilibrium- zero-sum games- Extensive Games with Perfect Information repeated games (prisoner's dilemma)- sub game perfect Nash equilibrium; computational issues	[9]
GAMES WITH IMPERFECT INFORMATION * Games with Imperfect Information - Bayesian Games – Motivational Examples – General Definitions –Information aspects – Illustrations - Extensive Games with Imperfect Information - Strategies- Nash Equilibrium – Beliefs and sequential equilibrium – Illustrations - Repeated Games – The Prisoner's Dilemma – Bargaining.	[9]
NON-COOPERATIVE GAME THEORY* Non-cooperative Game Theory - Self-interested agents- Games in normal form - Analyzing games: from optimality to equilibrium - Computing Solution Concepts of Normal-Form Games – Computing Nash equilibria of two-player, zero-sum games -Computing Nash equilibria of two player, general-sum games - Identifying dominated strategies.	[9]
MECHANISM DESIGN* Aggregating Preferences-Social Choice – Formal Model- Voting - Existence of social functions - Ranking systems - Protocols for Strategic Agents: Mechanism Design - Mechanism design with unrestricted preferences- Efficient mechanisms - Vickrey and VCG mechanisms (shortest paths) - Combinatorial auctions - profit maximization Computational applications of mechanism design - applications in Computer Science - Google's sponsored search - eBay auctions.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Osborne M. J, “An Introduction to Game Theory”, Oxford University Press, 2003.
2.	Nisan N, Roughgarden T, Tardos E, and Vazirani V.V, “Algorithmic Game Theory”, Cambridge University Press, 2007.
Reference(s):	
1.	Osborne M.J and Rubinstein A, “A Course in Game Theory”, MIT Press, 1994.
2.	Dixit A and Skeath S, “Games of Strategy”, W W Norton & Co Inc, 3rd Edition 2009.
3.	YoavShoham, Kevin Leyton-Brown, “Multi agent Systems: Algorithmic, Game- Theoretic, and Logical Foundations”, Cambridge University Press, 2008.

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Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215. Namakkal-Dt.

4.	Zhu Han, Dusit Niyato, Walid Saad, Tamer Basar and Are Hjorungnes, “Game Theory in Wireless and Communication Networks”, Cambridge University Press, 2012.

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**INTRODUCTION**	-
1.1	Introduction	1
1.2	Making rational choices: basics of Games	1
1.3	strategy - preferences	1
1.4	payoffs – Mathematical basics	1
1.5	Game theory – Rational Choice	1
1.6	Basic solution concepts-non cooperative versus cooperative games	1
1.7	Basic computational issues	1
1.8	finding equilibria and learning in games	1
1.9	Typical application areas for game theory (e.g. Google's sponsored search, eBay auctions, electricity trading markets)	1
2	**GAMES WITH PERFECT INFORMATION**	-
2.1	Games with Perfect Information	1
2.2	Strategic games - prisoner's dilemma, matching pennies Nash equilibria	2
2.3	theory and illustrations	2
2.4	Cournot's and Bertrand's models of oligopoly	1
2.5	auctions mixed strategy equilibrium	1
2.6	zero-sum games	1
2.7	Extensive Games with Perfect Information repeated games (prisoner's dilemma)	1
2.8	sub game perfect Nash equilibrium;	
2.9	computational issues.	
3	**GAMES WITH IMPERFECT INFORMATION**	-
3.1	Games with Imperfect Information	1
3.2	Bayesian Games	1
3.3	Motivational Examples	1
3.4	General Definitions	1
3.5	Information aspects	1
3.6	Illustrations - Extensive Games with Imperfect -Information -	1
3.7	Strategies- Nash Equilibrium	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.8	Beliefs and sequential equilibrium	1
3.9	Illustrations - Repeated Games – The Prisoner's Dilemma – Bargaining	1
4	**NON-COOPERATIVE GAME THEORY**	-
4.1	Non-cooperative Game Theory	1
4.2	Self-interested agents- Games in normal form	1
4.3	Analyzing games: from optimality to equilibrium	1
4.4	Computing Solution Concepts of Normal	1
4.5	Form Games	2
4.6	Computing Nash equilibria of two-player, zero-sum games	1
4.7	Computing Nash equilibria of two player,- general-sum games	1
4.8	Identifying dominated strategies	1
5	**MECHANISM DESIGN**	-
5.1	Aggregating Preferences-Social Choice	1
5.2	Formal Model- Voting - Existence of social functions	1
5.3	Ranking systems	1
5.4	Protocols for Strategic Agents: Mechanism Design	1
5.5	Mechanism design with unrestricted preferences	1
5.6	Efficient mechanisms	1
5.7	Vickrey and VCG mechanisms (shortest paths)	1
5.8	Combinatorial auctions - profit maximization Computational applications of mechanism design	1
5.9	applications in Computer Science	1
5.10	Google's sponsored search - eBay auctions	1

Course Designer(s)

1. Saradha.M saradha@ksrct.ac.in

60 CS E35	Block Chain Technology	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- Understand the basic concepts of Distributed systems and Cryptography Understand emerging abstract models for Block Chain Technology.
- Identify the challenges and technical gaps existing between theory and practice in cryptocurrency domain
- Design, build, and deploy smart contracts and distributed applications.

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

- Develop Block chain based applications and games

Pre-requisites

- Data Structures, Cryptography

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explore the basic concepts of Distributed database, Cryptography algorithms and functions.	Understand
CO2	Interpret the design principles of Blockchain and Mining concepts.	Understand
CO3	Understand the techniques of distributed consensus.	Understand
CO4	Apply the concepts of cryptocurrency and learn Ethereum development	Apply
CO5	Design and develop projects, smart contracts using Block-chain technology	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	2	2	-	-	-	-	
CO2	3	3	-	-	-	-	-	-			-	-	-	-	
CO3	3	3	-	-	-	-	-	-	2	2	-	-	-	-	
CO4	3	3	-	-	-	-	-	-			-	-	-	-	
CO5	3	3	-	-	-	-	-	-	2	2	-	2	-	-	
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	10	20
Understand	40	30	40
Apply	-	20	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E - Computer Science and Engineering								
60 CS E35 - Block Chain Technology								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Basics* Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof	[9]
Blockchain* Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.	[9]
Distributed Consensus* Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate	[9]
Cryptocurrency* History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, Truffle -Design and issue Crypto currency, Mining, DApps, GHOST, Vulnerability, Attacks, Sidechain, Namecoin.	[9]
Cryptocurrency Regulation and Applications* Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market andGlobal Economy. Applications: Internet of Things, E-Governance, Land Registration, Medical Record Management System, Domain Name Service and future of BlockchainNaive Blockchain construction - Hashcash implementation, Smart Contract Construction, AWS Blockchain Templates	[9]
Total Hours:	**45**
Text Book(s):	

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction”, Princeton University Press (July 19, 2016).
2.	Andreas M. Antonopoulos, “Mastering Ethereum : Programming the open Blockchain”,Oreilly
Reference(s):	
1.	Andreas M. Antonopoulos, “Mastering Bitcoin: Unlocking Digital Cryptocurrencies”,Oreilly
2.	DR. Gavin Wood, “ETHEREUM: A Secure Decentralized Transaction Ledger”, Yellow paper,2014
3.	Kedarlyer & Chris Dannen “Building games with Ethereum smart contracts: intermediate projects for Solidity developers”,Apress,2018.Aho. A.V., Hopcroft. J.E. and Ullman .J.D., “The Design and Analysis of Algorithms”, Addison-Wesley, 1974
4.	Andreas M. Antonopoulos,”MasteringEthereum: Building Smart Contracts and DApps”, Oreilly

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Basics**	
1.1	Distributed Database	1
1.2	Two General Problem	1
1.3	Byzantine General problem and Fault Tolerance	1
1.4	Hadoop Distributed File System	1
1.5	Distributed Hash Table, ASIC resistance	1
1.6	Turing Complete. Cryptography: Hash function	1
1.7	Randomized algorithms	1
1.8	Digital Signature - ECDSA	1
1.9	Memory Hard Algorithm, Zero Knowledge Proof	
2.0	**BLOCKCHAIN**	
2.1	Introduction	2
2.2	Advantage over conventional distributed database	2
2.3	Blockchain Network, Mining Mechanism	1
2.4	Distributed Consensus, Merkle Patricia Tree	1
2.5	Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy	1
2.6	Life of Blockchain application, Soft & Hard Fork	1
2.7	Private and Public blockchain	1
3.0	**DISTRIBUTED CONSENSUS**	
3.1	Nakamoto consensus	1
3.2	Proof of Work	1

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.3	Proof of Stake	1
3.4	Proof of Burn	2
3.5	Difficulty Level	1
3.6	Sybil Attack	1
3.7	Energy utilization and alternate.	2
4.0	**CRYPTOCURRENCY**	
4.1	History, Distributed Ledger, Bitcoin protocols	1
4.2	Mining strategy and rewards, Ethereum	1
4.3	Construction, DAO, Smart Contract	1
4.4	Truffle -Design and issue Crypto currency	1
4.5	Mining, DApps,	1
4.6	GHOST, Vulnerability	1
4.7	Attacks	1
4.8	Sidechain, Namecoin	2
5.0	**CRYPTOCURRENCY REGULATION AND APPLICATIONS**	
5.1	Stakeholders, Roots of Bit coin	1
5.2	Legal Aspects-Crypto currency Exchange	1
5.3	Black Market and Global Economy.	1
5.4	Applications: Internet of Things, E-Governance	1
5.5	Land Registration, Medical Record Management System	1
5.6	Domain Name Service and future of Blockchain	1
5.7	Naive Blockchain construction - Hashcash implementation	1
5.8	Smart Contract Construction	1
5.9	AWS Blockchain Templates.	1

Course Designer(s)

1. Mr.K.KAVIARASU– kaviarasuk@ksrct.ac.in

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60 CS E36	Computational Intelligence	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To provide a strong foundation on fundamental concepts in Computational Intelligence.
- To enable Problem-solving through various searching techniques.
- To apply these techniques in applications which involve perception, reasoning and learning.
- To apply Computational Intelligence techniques for information retrieval
- To apply Computational Intelligence techniques primarily for machine learning

Pre-requisites

- Programming knowledge, linear Algebra

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the goals and methods of Computational Intelligence	Understand
CO2	Study the knowledge representation and reasoning computational intelligence techniques	Apply
CO3	Apply the Intelligent techniques for problem solving.	Apply
CO4	Improve problem solving in the areas of reasoning and natural language.	Apply
CO5	Understand computer vision, automatic programming and machine learning.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3

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CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO1	3	3	2	2	2	-	-	-	-	-	-	2	-	-	-
CO2	3	3	2	2	2	-	-	-	-	-	-	2	-	3	-
CO3	3	2	2	2	2	2	-	-	-	-	-	2	-	3	-
CO4	3	2	2	2	2	2	-	-	-	-	-	3	-	3	-
CO5	3	3	2	2	2	-	-	-	-	-	-	3	-	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E - Computer Science and Engineering								
60 CS E36– Computational Intelligence								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

INTRODUCTION* Introduction to Artificial Intelligence-Search-Heuristic Search-A* algorithm-Game Playing-Alpha-Beta Pruning-Expert systems-Inference-Rules-Forward Chaining and Backward Chaining- Genetic Algorithms.	**[9]**
KNOWLEDGE REPRESENTATION AND REASONING* Proposition Logic – First Order Predicate Logic – Unification – Forward Chaining Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering – Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information – Prolog Programming.	**[9]**
UNCERTAINTY* Non monotonic reasoning-Fuzzy Logic-Fuzzy rules-fuzzy inference-Temporal LogicTemporal Reasoning-Neural Networks-Neuro-fuzzy Inference.	**[8]**

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

LEARNING** Probability basics – Bayes Rule and its Applications – Bayesian Networks – Exact and Approximate Inference in Bayesian Networks – Hidden Markov Models – Forms of Learning – Supervised Learning – Learning Decision Trees – Regression and Classification with Linear Models – Artificial Neural Networks – Nonparametric Models – Support Vector Machines – Statistical Learning– Learning with Complete Data – Learning with Hidden Variables- The EM Algorithm – Reinforcement Learning.	**[10]**
INTELLIGENCE AND APPLICATIONS** Natural language processing - Morphological Analysis-Syntax analysis-Semantic Analysis-AII applications – Language Models – Information Retrieval – Information Extraction – Machine Translation – Machine Learning – Symbol-Based – Machine Learning: Connectionist – Machine Learning.	**[9]**
Total Hours:	**45**

Text Book(s):	
1.	Russel S and Norvig P, “Artificial Intelligence – A Modern Approach”, Fourth Edition, Pearson Education, 2022.
2.	Elaine Rich and Kevin Knight, “Artificial Intelligence”, Third Edition, Tata McGrawHill, 2010.
Reference(s):	
1.	Dan W. Patterson, “Introduction to AI and ES”, Third Edition, Pearson Education, 2007.
2.	Nils J. Nilsson, “The Quest for Artificial Intelligence”, Cambridge University Press, 2009.
3.	Nptel course, Artificial Intelligence, https://nptel.ac.in/courses/106106126/
4.	Stuart Russell,” Human Compatible – Artificial Intelligence and the Problem of Control”, Viking publisher, 2019.

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**INTRODUCTION**	
1.1	Introduction to Artificial Intelligence	1
1.2	Search - Heuristic Search	1
1.3	A* algorithm	1
1.4	Game Playing	1
1.5	Alpha-Beta Pruning	1
1.6	Expert systems	1

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.7	Inference - Rules	1
1.8	Forward Chaining and Backward Chaining	1
1.9	Genetic Algorithms	1
2.0	**KNOWLEDGE REPRESENTATION AND REASONING**	
2.1	Proposition Logic – First Order Predicate Logic	1
2.2	Unification, First-order logic	1
2.3	Forward Chaining -Backward Chaining	1
2.4	Resolution	1
2.5	Ontological Engineering	1
2.6	Categories and Objects	1
2.7	Events - Mental Events and Mental Objects	1
2.8	Reasoning Systems for Categories – Reasoning with Default Information	1
2.9	Prolog Programming	1
3.0	**UNCERTAINTY**	
3.1	Non monotonic reasoning	1
3.2	Fuzzy Logic	1
3.3	Fuzzy rules	1
3.4	fuzzy inference	1
3.5	Temporal Logic	1
3.6	Temporal Reasoning	1
3.7	Neural Networks	1
3.8	Neuro-fuzzy Inference	1
4.0	**LEARNING**	
4.1	Probability basics	1
4.2	Bayes Rule and its Applications – Bayesian Networks	1
4.3	Exact and Approximate Inference in Bayesian Networks	1
4.4	Hidden Markov Models	1
4.5	Forms of Learning – Supervised Learning	1
4.6	Learning Decision Trees – Regression and Classification with Linear Models	1
4.7	Artificial Neural Networks	1
4.8	Nonparametric Models – Support Vector Machines	1
4.9	Statistical Learning– Learning with Complete Data, Learning with Hidden Variables	1
4.10	The EM Algorithm – Reinforcement Learning	1
5.0	**INTELLIGENCE AND APPLICATIONS**	
5.1	Natural language processing	1
5.2	Morphological Analysis	1
5.3	Syntax analysis-Semantic Analysis	1
5.4	All applications – Language Models	1
5.5	Information Retrieval	1
5.6	Information Extraction	1
5.7	Machine Translation	1

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.8	Machine Learning – Symbol-Based	1
5.9	Machine Learning: Connectionist – Machine Learning.	1

Course Designer(s)

1.Ms. M. Saradha -saradha@ksrct.ac.in

60 CS E37	Data Analytics	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To know the basic data analytics concepts
- To understand the Data Collection and Preprocessing
- To understand Exploratory Data Analytics (EDA)
- To learn Statistical Data Analytics
- To know about Distributed File Systems

Pre-requisites

- Python Programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic concepts of data analytics	Understand
CO2	Understand the data collection and preprocessing	Understand
CO3	Apply Exploratory Data Analytics (EDA)	Apply
CO4	Apply the knowledge of statistical data analytics	Apply
CO5	Understand the distributed file systems	Understand

Mapping with Programme Outcomes

Cos	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
CO2	2	3	3	-	3	-	-	-	-	-	-	3	-	3	-
CO3	3	3	2	-	3	-	-	-	2	2	2	3	-	3	-
CO4	3	3	2	-	3	-	-	2	2	2	2	3	-	3	-
CO5	3	3	3	-	3	-	-	2	2	2	2	3	-	3	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	10	10
Understand	40	30	50
Apply	-	20	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E - Computer Science and Engineering								
60 CS E37 - Data Analytics								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.	
Introduction Overview of Data Analytics - Business Intelligence- Pattern Recognition- Data Processing Chain- BI for Better Decisions- Decision Types- BI Tools - BI Applications - Introduction to Big Data - Data analysis life cycle - Overview of popular programming tools (Python, R, SQL) for data analysis - Introduction to data visualization tools (Tableau, Power BI) and their significance - Understand the statistical concepts: descriptive and inferential statistics - summary statistics: mean, median, mode, range, standard deviation, quartiles and correlation.	[9]
Data Collection and Preprocessing Introduction to Data Sources - Data Cleaning - Data Transformation - Normalization/Scaling- Log Transformation - Handling Categorical Data- One-Hot Encoding- Label Encoding- Dealing with Imbalanced Data - Handling Date and Time Data- Feature Engineering- Removing Redundant Features - Data Integration- Handling Duplicate Data- Data Splitting - Data Standardization.	[9]
Exploratory Data Analytics (EDA) Introduction, Data Visualization Techniques -Univariate, Bivariate, and Multivariate Plots - Selection of Appropriate Charts (Histograms, Box Plots, Scatter Plots) - Data Distribution Analysis: Normality Testing, Skewness and Kurtosis, Correlation and Covariance - Handling Outliers in EDA - Data Patterns and Trends: Time Series Analysis, Seasonality and Trends - Exploring Relationships: Heatmaps for Correlation, Pair Plots - Hypothesis Testing: Formulating Hypotheses and Selecting the Right Test (T-Tests, ANOVA) - Interactive EDA Tools: Use Tools like Tableau Power BI and create interactive Dashboards.	[9]

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Tiruchengode - 637 215, Namakkal-Dt.

Statistical Data Analytics Linear Regression - Logistic Regression - Multinomial Logistic Regression - Poisson Regression - Generalized Linear Models (GLM) - Time Series Models.	[9]
Distributed File Systems Hadoop Distributed File System (HDFS) and Google File System (GFS) - NoSQL Databases: Explore distributed databases like Apache Cassandra, MongoDB, or Amazon DynamoDB. Distributed Processing - MapReduce programming model for distributed processing. Apache Spark framework for in-memory data processing.	[9]
Total Hours:	**45**

Text Book(s):	
1	Anil Maheshwari, “Data Analytics – Made Accessible”, Kindle Edition, 1st edition, 2014.
2	Michael Berthhold, David J.Hand, “Intelligent Data Analysis”, Springer, 2nd Edition, 2015.

Reference(s) :	
1.	Shai Vaingast, “Beginning Python Visualization Crafting Visual Transformation Scripts”, Apress, 2nd edition, 2014.
2.	Wes Mc Kinney, “Python for Data Analysis”, O'Reilly Media, 2012
3.	White, “Hadoop: The Definitive Guide”, Third Edition - O’Reilly , 2012.
4.	http://blog.matthewrathbone.com/2013/11/17/python-map-reduce-on-hadoop---abeginnerstutorial.html
5.	http://www.michael-noll.com/tutorials/writing-an-hadoop-mapreduce-program-in-python/
6.	http://allthingshadoop.com/category/python/

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Overview of Data Analytics	1
1.2	Business Intelligence- Pattern Recognition	1
1.3	Data Processing Chain - BI for Better Decisions	1
1.4	Decision Types- BI Tools - BI Applications	1
1.5	Introduction to Big Data - Data analysis life cycle	1
1.6	Overview of popular programming tools (Python, R, SQL) for data analysis	1
1.7	Introduction to data visualization tools (Tableau, Power BI) and their significance	1
1.8	Understand the statistical concepts: descriptive and inferential statistics	1
1.9	summary statistics: mean, median, mode, range, standard deviation, quartiles and correlation	1
2.0	**Data Collection and Preprocessing**	
2.1	Introduction to Data Sources - Data Cleaning	2
2.2	Data Transformation - Normalization/Scaling	1
2.3	Log Transformation - Handling Categorical Data	1
2.4	One-Hot Encoding- Label Encoding	1
2.5	Dealing with Imbalanced Data - Handling Date and Time Data.	1
2.6	Feature Engineering- Removing Redundant Features - Data Integration	2
2.7	Handling Duplicate Data- Data Splitting - Data Standardization.	1

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.0	**Exploratory Data Analytics (EDA**	
3.1	Introduction, Data Visualization Techniques -Univariate, Bivariate, and Multivariate Plots	1
3.2	Selection of Appropriate Charts (Histograms, Box Plots, Scatter Plots)	2
3.3	Data Distribution Analysis: Normality Testing, Skewness and Kurtosis, Correlation and Covariance	1
3.4	Handling Outliers in EDA - Data Patterns and Trends: Time Series Analysis, Seasonality and Trends	2
3.5	Exploring Relationships: Heatmaps for Correlation, Pair Plots - Hypothesis Testing: Formulating Hypotheses and Selecting the Right Test (T-Tests, ANOVA)	2
3.6	Interactive EDA Tools: Use Tools like Tableau Power BI and create interactive Dashboards	1
4.0	**Statistical Data Analytics**	
4.1	Linear Regression	2
4.2	Logistic Regression	2
4.3	Multinomial Logistic Regression	1
4.4	Poisson Regression	1
4.5	Generalized Linear Models (GLM)	2
4.6	Time Series Models	1
5.0	**Distributed File Systems**	
5.1	Hadoop Distributed File System (HDFS) and Google File System (GFS).	2
5.2	NoSQL Databases: Explore distributed databases like Apache Cassandra, MongoDB, or Amazon DynamoDB. Distributed Processing	3
5.3	MapReduce programming model for distributed processing	2
5.4	Apache Spark framework for in-memory data processing	2

Course Designer(s)

1. Dr. A. Gnanabaskaran - gnanabaskarana@ksrct.ac.in

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Tiruchengode - 637 215, Namakkal-Dt.

60 CS E41	Natural Language Processing	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn the fundamentals of natural language processing.
- To learn and understand the word level analysis methods.
- To explore the syntactic analysis concepts of grammar, parsing and probabilistic.
- To learn and understand the semantics and pragmatics.
- To learn the design and implementation of discourses and lexical resources.

Pre-requisites

- Machine Learning, Python Programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the use of regular expression and tokenization for the basic language features.	Understand
CO2	Interpret the tags for the word level analysis.	Understand
CO3	Examine the real time system to tackle morphology and syntax of a language.	Understand
CO4	Design a tag set to be used for statistical processing for real-time applications.	Apply
CO5	Analyze and compare the use of various statistical approaches for different types of NLP applications.	Analyze

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	3	2	3	3	-	1	-	-	-	1	3	3	-
CO2	2	3	3	2	3	3	-	1	-	-	-	1	3	3	-
CO3	2	3	3	2	3	3	-	1	-	-	-	1	3	3	-
CO4	2	3	3	2	3	3	-	1	-	-	-	1	3	3	-
CO5	2	3	3	2	3	3	-	1	-	-	-	1	3	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	15	10	10
Understand	45	20	25
Apply	-	30	45

Rev. No.4/w.e.f. 01.06.2024

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CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Analyse	-	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E41 – Natural Language Processing								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

INTRODUCTION * & ** Origins and Challenges of NLP – Language Modeling: Grammar-Based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for Lexicon and Rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.	**[9]**
WORD LEVEL ANALYSIS * & ** Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-Based, Stochastic and Transformation –Based Tagging, Issues in PoS Tagging – Hidden Markov and Maximum Entropy Models.	**[9]**
SYNTACTIC ANALYSIS * & ** Context-Free Grammars, Grammar Rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming Parsing – Shallow Parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature Structures, Unification of Feature Structures.	**[9]**
SEMANTICS AND PRAGMATICS * & ** Requirements for Representation, First-Order Logic, Description Logics – Syntax-Driven Semantic Analysis, Semantic Attachments – Word Senses, Relations Between Senses, Thematic Roles, Selectional Restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary and Thesaurus, Bootstrapping Methods – Word Similarity using Thesaurus and Distributional methods.	**[9]**
DISCOURSE ANALYSIS AND LEXICAL RESOURCES * & ** Discourse Segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, Brown Corpus, British National Corpus (BNC).	**[9]**
Total Hours:	**45**

Text Book(s):	
1.	Daniel Jurafsky and James H. Martin, “Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition”, Pearson Publication, First Edition, 2023.
2.	Steven Bird, Ewan Klein and Edward Loper, “Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit”, O‘Reilly Media, First Edition, 2009.
Reference(s):	
1.	Breck Baldwin and Krishna Dayanidhi, “Language Processing with Java and LingPipe Cookbook”, Atlantic Publisher, 2015.

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	Richard M Reese and AshishSingh Bhatia, “Natural Language Processing with Java”, Packt Publishing, Second Edition, 2018.
3.	Nitin Indurkhya and Fred J. Damerau, “Handbook of Natural Language Processing”, CRC Press, Second Edition, 2010.
4.	Tanveer Siddiqui and U.S. Tiwary, “Natural Language Processing and Information Retrieval”, Oxford University Press, 2008.
5.	James Allen “Natural Language Understanding”, Pearson Publication, Eighth Edition, 2012.

*** SDG 4 – Quality Education**

**** SDG 9 - Industry Innovation and Infrastructure**

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Origins and Challenges of NLP	1
1.2	Language Modeling, Grammar-Based LM and Statistical LM	2
1.3	Regular Expressions	1
1.4	Finite-State Automata	1
1.5	English Morphology	1
1.6	Transducers for Lexicon and Rules, Tokenization	1
1.7	Detecting and Correcting Spelling Errors	1
1.8	Minimum Edit Distance	1
2.0	**Word Level Analysis**	
2.1	Unsmoothed N-grams, Evaluating N-grams	1
2.2	Smoothing, Interpolation and Backoff	1
2.3	Word Classes, Part-of-Speech Tagging	1
2.4	Rule-Based, Stochastic	1
2.5	Transformation-Based Tagging	2
2.6	Issues in PoS Tagging	1
2.7	Hidden Markov and Maximum Entropy Models	2
3.0	**Syntactic Analysis**	
3.1	Context-Free Grammars, Grammar Rules for English	1
3.2	Treebanks, Normal Forms for Grammar	1
3.3	Dependency Grammar	1
3.4	Syntactic Parsing, Ambiguity, Dynamic Programming Parsing	2
3.5	Shallow Parsing, Probabilistic CFG	1
3.6	Probabilistic CYK, Probabilistic Lexicalized CFGs	2
3.7	Feature Structures, Unification of Feature Structures	1
4.0	**Semantics and Pragmatics**	
4.1	Requirements for Representation, First-Order Logic, Description Logics	1

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.2	Syntax-Driven Semantic Analysis, Semantic Attachments	1
4.3	Word Senses, Relations Between Senses	1
4.4	Thematic Roles, Selectional Restrictions	1
4.5	Word Sense Disambiguation, WSD using Supervised	2
4.6	Dictionary and Thesaurus, Bootstrapping Methods	1
4.7	Word Similarity using Thesaurus	1
4.8	Distributional Methods	1
5.0	**Discourse Analysis and Lexical Resources**	
5.1	Discourse Segmentation, Coherence	1
5.2	Reference Phenomena	1
5.3	Anaphora Resolution using Hobbs and Centering Algorithm	2
5.4	Coreference Resolution	1
5.5	Porter Stemmer, Lemmatizer	1
5.6	Penn Treebank, Brill's Tagger	1
5.7	Brown Corpus	1
5.8	British National Corpus	1

Course Designer(s)

1. Dr. R.GOPINATH - gopinath@ksrct.ac.in

60 CS E42	**Industrial Applications Development and Deployment Practices**	**Category**	**L**	**T**	**P**	**Credit**
		PE	**3**	**0**	**0**	**3**

Objectives

- To provide a comprehensive understanding of Real-Time IoT applications.
- To understand effective project management and issue tracking using JIRA.
- To learn version control fundamentals and seamless CI/CD integration.
- Develop expertise in InstallAnywhere for cross-platform installation and deployment. To understand hands-on experience in Docker architecture.

Pre-requisites

- Software Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Design, deploy, and optimize real-time IoT applications in healthcare by leveraging IoT technologies.	Apply
CO2	Understand efficiently manage projects, track issues, customize workflows, and leverage JIRA's capabilities across diverse projects.	Understand
CO3	Integrating CI/CD practices via hands-on project work with Helix Core for streamlined software development workflows.	Apply

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO4	Create and deploy efficient, user-friendly installers across multiple platforms through hands-on projects in InstallAnywhere 2018.	Apply
CO5	Deploy and manage containerized applications proficiently using Docker, covering Docker Hub, image manipulation, commands.	Apply

Mapping with Programme Outcomes

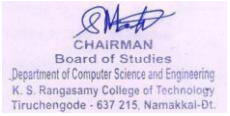
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	-	3	2	-	-	3	2	2	3	2	-
CO2	3	3	3	-	-	3	2	-	-	3	2	2	3	2	-
CO3	3	3	3	-	-	3	2	-	-	3	2	2	3	2	-
CO4	3	2	3	-	-	3	2	-	-	3	2	2	3	2	-
CO5	3	2	3	-	-	3	2	-	-	3	2	2	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	20	20	40
Apply	20	20	30
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 CS E42 - Industrial Applications Development and Deployment Practices							
Semester	Hours/Week			Total Hours	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100
Architectural Overview: Real Time IoT Applications* Internet of Things: Data Analytics, IoT data acquisition, Data Exploration and Preprocessing, IoT technologies, Layered Architecture of Medical IoT Systems, Challenges in IoT, Overview of Infusion Pumps, Demonstration of Real-Time Medication Safety software, Data visualization, clustering and classification using orange data mining tool for Medical Records. AI and Agile systems in health care, Future of Health care. Tools: Cloud AWS, CloudFront, Cloud S3 Bucket, QuickSight and Orange.							**[9]**



Effective Project Management and Issue Tracking* Overview of JIRA's role in project management and issue tracking, Creating, and managing issues, customizing workflows, and utilizing agile boards, Custom dashboards, automation rules, permissions, and security management, Integrating JIRA with other tools, creating meaningful reports, and analyzing project data, effective utilization of JIRA in diverse projects.	**[9]**
Source Code Management & CI/CD Integration* Introduction to version control systems, Understanding the need for version control in software development, Overview of Perforce and its role in version control, Installing Perforce server and client, understanding user roles and permissions, Basic Perforce commands: p4 add, p4 edit, p4 submit, p4 sync, Branching and Merging, Collaboration and Code Review, Automation and CI/CD Integration. Project Hands-on using Perforce Helix Core Tool.	**[9]**
Cross-Platform Installation and Deployment* Install Anywhere as a cross-platform installation tool, building a basic installer package, customizing installation options and user prompts, custom actions and scripting, license management and software updates, best practices for creating efficient and user-friendly installers, Deploying installers across different platforms. Project Hands-on using InstallAnyWhere 2018	**[9]**
DevOps Containerization using Docker* Docker - An Architectural overview - The Docker Hub - Installation and configuration - Docker images - Docker commands - Saving and Loading Docker Images - Docker Compose – Run applications using Docker. Exercises: Installation of docker and Image Setup, creating a Custom Image from a Docker file, creating own Images, Exposing Container Ports to the Host and test it.	**[9]**
Total Hours:	**45**
Text Book(s):	

1.	Dr Kamlesh Lakhwani, Dr Hemant Kumar Gianey, Joseph Kofi Wireko, “Internet of Things (IoT)”, First Edition, BPB Publications, 2020.
2.	Sricharan Vadapalli, “Devops: Continuous Delivery, Integration, and Deployment with Devops: Dive into the core DevOps strategies”, Ingram short title, 2018.
Reference(s):	
1.	Sricharan Vadapalli, “Hands-on DevOps: Explore the concept of continuous delivery and integrate it with data science concepts”, Packt Publishing Limited, 2017.
2.	Eberhard Wolff, “A Practical Guide to Continuous Delivery”, Addison-Wesley Professional, 2017.
3.	Paul Duvall, Steve Matyas, Andrew Glover, “Continuous Integration: Improving Software Quality and Reducing Risk”, 1st Edition, Pearson Addison-Wesley, 2007.
4.	Jean-Marcel Belmont, “Hands-On Continuous Integration and Delivery”, 1st Edition, Packt Publishing, 2018.

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Architectural Overview: Real Time IoT Applications**	

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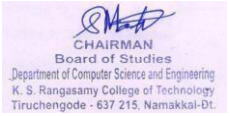
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.1	Internet of Things: Data Analytics, IoT data acquisition	2
1.2	Data Exploration and Pre-processing	1
1.3	IoT technologies, Layered Architecture of Medical IoT Systems	1
1.4	Challenges in IoT, Overview of Infusion Pumps	1
1.5	Demonstration of Real-Time Medication Safety software	1
1.6	Data visualization	1
1.7	Clustering and classification using orange data mining tool for Medical Records	1
1.8	AI and Agile systems in health care, Future of Health care	1
2.0	**Effective Project Management and Issue Tracking**	
2.1	Overview of JIRA's role in project management and issue tracking, Creating, and managing issues	2
2.2	Customizing workflows, and utilizing agile boards	1
2.3	Custom dashboards, automation rules	1
2.4	Permissions, and security management	1
2.5	Integrating JIRA with other tools	1
2.6	Creating meaningful reports, and analyzing project data	2
3.0	Effective utilization of JIRA in diverse projects.	1
3.1	Introduction to version control systems	1
3.2	Understanding the need for version control in software development	1
3.3	Overview of Perforce and its role in version control	1
3.4	Installing Perforce server and client	1
3.5	Understanding user roles and permissions	1
3.6	Basic Perforce commands: p4 add, p4 edit, p4 submit, p4 sync	1
3.7	Branching and Merging, Collaboration and Code Review	1
3.8	Automation and CI/CD Integration	1
3.9	Project Hands-on using Perforce Helix Core Tool.	1
4.0	**Cross-Platform Installation and Deployment**	
4.1	InstallAnywhere as a cross-platform installation tool	1
4.2	Building a basic installer package	1
4.3	Customizing installation options and user prompts	2
4.4	Custom actions and scripting	1
4.5	License management and software updates	1
4.6	Best practices for creating efficient and user-friendly installers	1
4.7	Deploying installers across different platforms	1
4.8	Project Hands-on using InstallAnyWhere 2018	1
5.0	**DevOps Containerization using Docker**	
5.1	Docker - An Architectural overview	1
5.2	Docker Hub - Installation and configuration	1
5.3	Docker images - Docker commands	1
5.4	Saving and Loading Docker Images	1
5.5	Docker Compose	1
5.6	Run applications using Docker	2



Course Designer(s)

1. Ms. S. Mithuna – mithuna@ksrct.ac.in

60 CS E43	Human Computer Interaction	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn the foundations of Human Computer Interaction
- Be familiar with the design technologies for individuals and persons with disabilities
- Be aware of mobile Human Computer interaction
- To understand the mobile ecosystem
- To design web interfaces

Pre-requisites

- Machine Learning

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Learn the foundations of Human Computer Interaction	Understand
CO2	Apply design technologies for individuals and persons with disabilities	Apply
CO3	Understand the mobile ecosystem	Understand
CO4	Design web interfaces using tools	Apply
CO5	Analyse recent trends in Speech Recognition and Translation, Multimodal System	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2	-	1	2	2	-	-	-	-	-	-	3	-	-
CO2	3	2	-	2	2	2	-	-	-	-	-	-	3	-	-
CO3	1	2	-	3	3	2	-	-	-	-	-	-	3	-	-
CO4	1	2	2	3	3	2	-	-	-	-	-	-	3	-	-
CO5	2	2	2	3	3	2	-	-	-	-	-	-	3	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Remember	10	10	20
Understand	30	30	20
Apply	20	20	40
Analyse	-	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E43 – Human Computer Interaction								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100
Introduction* I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory –processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity-Paradigms.								**[10]**
Interactive Design* Basics–process–scenarios–navigation–screen design–Iteration and prototyping. HCIin software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules–principles, standards, guidelines, rules. Evaluation Techniques–Universal Design. Cognitive models–Socio-Organizational issues and stakeholder requirements–Communication and collaboration models-Hypertext, Multimedia and WWW.								**[11]**
Mobile Ecosystem* Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games - Mobile Information Architecture, Mobile2.0, Mobile Design: Elements of Mobile Design, Tools								**[9]**
Inter Procedural Optimization* Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow .Case Studies.								**[9]**
Recent Trends : Speech Recognition and Translation ,Multimodal System								**[6]**

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

	Total Hours:	**45**
Text Book(s):		
1.	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2004 (UNITI,II&III).	
2.	Brian Fling, “Mobile Design and Development”, First Edition ,OReilly MediaInc., 2009 (UNIT–IV)	
Reference(s):		
1.	Bill Scottand Theresa Neil, “Designing Web Interfaces”, First Edition, OReilly, 2009.(UNIT-V)	
2.	Preece, J.etal, “Human-computer interaction”, Addison-Wesley Publishing Company, Inc., MA,1994.	
3.	Shneiderman, B., “Designing the user interface: Strategies for effective human –computer interaction”, 2nd edition, Addison-Wesley Publishing Company, Inc., Reading, MA,1992.	
4.	Laurel B.,“The art of human – computer interface design”, Addison Wesley Publishing Company, Inc., Reading MA,1990.	

*SDG 9 - Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Introduction**	
1.1	I/O Channels	2
1.2	Memory	1
1.3	Processing and Networks	2
1.4	Interaction: Models	1
1.5	Frameworks and Ergonomics	1
1.6	Styles and Elements	1
1.7	Interactivity-Paradigms	1
2	**Interactive Design**	
2.1	Basics	2
2.2	Process and Scenarios	1
2.3	Navigation and Screen Design	1
2.4	Iteration and Prototyping	1

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.5	HClin Software Process, Software lifecycle	1
2.6	Usability Engineering, Prototyping in practice and Design Rationale	1
2.7	Design Rules- Principles, Standards	1
2.8	Guidelines, Rules	1
2.9	Evaluation Techniques- Universal Design	1
2.10	Cognitive models–Socio-Organizational issues and stake holder requirements	1
2.11	Communication and collaboration models-Hypertext, Multimedia and WWW	1
3.0	**Mobile Ecosystem**	
3.1	Platforms	1
3.2	Application Frameworks	1
3.3	Types of Mobile Applications: Widgets, Applications, Games	1
3.4	Mobile Information Architecture	2
3.5	Mobile 2.0	1
3.6	Mobile Design: Elements of mobile design	2
3.7	Tools	1
4.0	**Inter Procedural Optimization**	
4.1	Designing Web Interfaces	1
4.2	Drag and Drop	1
4.3	Direct Selection	1
4.4	Contextual tools	1
4.5	Overlays, Inlays	1
4.6	Virtual Pages	1
4.7	Process Flow	1
4.8	Case Studies	2
5	**Recent Trends**	
5.1	Speech Recognition and Translation	3
5.2	Multimodal System	3

Course Designer(s)

1. Ms. S.Suganya -suganya@ksrct.ac.in

60 CS E44	Multicore Architecture and Programming	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the need for multi-core processors, and their architecture.
- To understand the challenges in parallel and multi- threaded programming. □ □

To learn about the various parallel programming paradigms, To develop multicore programs and design parallel solutions.

- To learn about serial and parallel processor

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Pre-requisites

- Computer Architecture

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Describe multicore architectures and identify their characteristics and challenges.	Remember
CO2	Identify the issues in programming Parallel Processors.	Understand
CO3	Write programs using OpenMP and MPI.	Understand
CO4	Design parallel programming solutions to common problems.	Apply
CO5	Compare and contrast programming for serial processors and programming for parallel processors.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	3	-	3	-	-	-	2	2	-	-	3	3	-
CO2	2	3	3	-	3	-	-	-	2	2	-	-	3	3	-
CO3	2	3	3	-	3	-	-	-	2	2	-	-	3	3	-
CO4	3	3	3	-	3	-	-	-	2	2	-	-	3	3	-
CO5	2	3	3	-	3	-	-	-	2	2	-	-	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	50	30	40
Apply	-	20	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 CS E44 - Multicore Architecture and Programming							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Multi-Core Processors* Single core to Mult i- core architectures – SIMD and MIMD systems – Interconnection networks – Symmetric and Distributed Shared Memory Architectures – Cache coherence – Performance Issues – Parallel program design.	[9]
Parallel Programing Challenges* Performance – Scalability – Synchronization and data sharing – Data races – Synchronization primitives (mutexes, locks, semaphores, barriers) – deadlocks and livelocks – communication between threads (condition variables, signals, message queues and pipes)..	[9]
Shared Memory Programming With OpenMP* OpenMP Execution Model – Memory Model – OpenMP Directives – Work-sharing Constructs – Library functions – Handling Data and Functional Parallelism – Handling Loops – Performance Considerations.	[9]
Distributed Memory Programming with MPI* MPI program execution – MPI constructs – libraries – MPI send and receive – Point-topoint and Collective communication – MPI derived datatypes – Performance evaluation.	[9]
Parallel Programing Development* Case studies – n-Body solvers – Tree Search – OpenMP and MPI implementations and comparison.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Peter S. Pacheco, “An Introduction to Parallel Programming”, Morgan-Kauffman/Elsevier, 2011.
2.	Gove, “Multicore Application Programming for Windows, Linux, and Oracle Solaris”, Pearson, 2011.
Reference(s):	
1.	Michael J Quinn, “Parallel programming in C with MPI and OpenMP”, Tata McGraw Hill,2003.
2.	Victor Alessandrini, “Shared Memory Application Programming - Concepts and Strategies in Multicore Application Programming, 1st Edition, Morgan Kaufmann, 2015.
3.	Yan Solihin, “Fundamentals of Parallel Multicore Architecture”, CRC Press, 2015.

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

S. No.	Topics	No. of hours
1	**Multi-Core Processors**	
1.1	Single core to Multi-core architectures	1
1.2	SIMD systems	1
1.3	MIMD systems	
1.4	Interconnection networks	1
1.5	Symmetric and Distributed Shared Memory Architectures	2
1.6	Cache coherence	1
1.7	Performance Issues	1
1.8	Parallel program design	2
2	**Parallel Program Challenges**	
2.1	Performance	1
2.2	Scalability	1
2.3	Synchronization and data sharing	2
2.4	Data races	1
2.5	Synchronization primitives- mutexes, locks, semaphores, barriers	2
2.6	Deadlocks and livelocks	1
2.7	Communication between threads -condition variables, Signals, Message Queues and Pipes	2
3	**Shared Memory Programming With OpenMP**	
3.1	OpenMP Execution Model	1
3.2	Memory Model	1
3.3	OpenMP Directives	2
3.4	Work-sharing Constructs	1
3.5	Library functions	1
3.6	Handling Data and Functional Parallelism	2
3.7	Handling Loops	1
3.8	Performance Considerations.	1
4	**Distributed Memory Programming with MPI**	
4.1	MPI program execution	1
4.2	MPI constructs	2
4.3	Libraries	1
4.4	MPI send and receive	1
4.5	Point-to-point and Collective communication	2
4.6	MPI derived datatypes	1
4.7	Performance evaluation	1
5	**Parallel Program Development**	
5.1	Case studies – n-Body solvers	2
5.2	Tree Search	2
5.3	OpenMP and MPI implementations.	2
5.4	OpenMP and MPI comparison.	1

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Designer(s)

1. Ms.T.Subalaxmi- subalaxmi@ksrct.ac.in

60 CS E45	Ethical Hacking	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the basics of computer based vulnerabilities.
- To explore different foot printing, reconnaissance and scanning methods.
- To expose the enumeration and vulnerability analysis methods.
- To understand hacking options available in Web and wireless applications.
- To explore the options for network protection.

Pre-requisites

- Cryptography and Network Security

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Express knowledge on basics of computer based vulnerabilities	Remember
CO2	Understand different foot printing, reconnaissance and scanning methods.	Understand
CO3	Demonstrate the enumeration and vulnerability analysis methods	Apply
CO4	Understand hacking options available in web and wireless applications	Understand
CO5	Acquire knowledge on the options for network protection and perform ethical hacking to expose the vulnerabilities.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	3	-	3	-	-	-	-	-	1	-	2	-	-
CO2	2	3	3	-	3	-	-	-	-	-	-	-	2	-	-
CO3	2	3	3	-	3	-	-	-	-	-	2	2	2	-	-
CO4	3	3	3	-	3	-	-	-	-	1	2	-	3	-	-
CO5	2	3	3	-	3	-	-	-	-	1	2	-	2	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	50	30	50
Apply	-	20	30
Analyse	-	-	-

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E45 – Ethical Hacking								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction * Ethical Hacking Overview - Role of Security and Penetration Testers .- PenetrationTesting Methodologies- Laws of the Land - Overview of TCP/IP- The Application Layer - The Transport Layer - The Internet Layer - IP Addressing .- Network and Computer Attacks -	**[9]**
Malware - Protecting Against Malware Attacks.- Intruder Attacks - Addressing Physical Security.	
Foot Printing, Reconnaissance and Scanning Networks* Footprinting Concepts - Footprinting through Search Engines, Web Services, Social Networking Sites, Website, Email - Competitive Intelligence - Footprinting through Social Engineering - Footprinting Tools - Network Scanning Concepts - Port-Scanning Tools - Scanning Techniques - Scanning Beyond IDS and Firewall.	**[9]**
Enumeration and Vulnerability Analysis* Enumeration Concepts - NetBIOS Enumeration – SNMP, LDAP, NTP, SMTP and DNS Enumeration - Vulnerability Assessment Concepts - Desktop and Server OS Vulnerabilities - Windows OS Vulnerabilities - Tools for Identifying Vulnerabilities in Windows- Linux OS Vulnerabilities- Vulnerabilities of Embedded Oss.	**[9]**
System Hacking* Hacking Web Servers - Web Application Components- Vulnerabilities - Tools for Web Attackers and Security Testers Hacking Wireless Networks - Components of a Wireless Network – Wardriving- Wireless Hacking - Tools of the Trade.	**[8]**

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Network Protection Systems* Access Control Lists - Cisco Adaptive Security Appliance Firewall - Configuration and Risk Analysis Tools for Firewalls and Routers - Intrusion Detection and Prevention Systems – Network Based and Host-Based IDSs and IPSs - Web Filtering - Security Incident Response Teams – Honeypots.		**[9]**
	Total Hours: (Lecture - 30; Practical - 30)	**60**
Text Book(s):		
1.	Michael T. Simpson, Kent Backman, and James E. Corley, “Hands-On Ethical Hacking and Network Defense, Course Technology”, Delmar Cengage Learning, 2010.	
2.	Patrick Engebretson, “The Basics of Hacking and Penetration Testing”, SYNGRESS, Elsevier, 2013.	
Reference(s):		
1.	Dafydd Stuttard and Marcus Pinto, “The Web Application Hacker’s Handbook: Finding and Exploiting Security Flaws”, 2011.	
2.	Justin Seitz, “Black Hat Python: Python Programming for Hackers and Pentesters”, 2014.	

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction**	
1.1	Ethical Hacking Overview - Role of Security and Penetration Testers	1
1.2	Penetration-Testing Methodologies	1
1.3	Laws of the Land - Overview of TCP/IP	1
1.4	The Application Layer	1
1.5	The Transport Layer - The Internet Layer	1
1.6	IP Addressing .- Network and Computer Attacks	1
1.7	Malware - Protecting Against Malware Attacks	1
1.8	Intruder Attacks - Addressing Physical Security	1
2	**Foot Printing, Reconnaissance and Scanning Networks**	
2.1	Footprinting Concepts – Footprinting through Search Engines	2
2.2	Web Services, Social Networking Sites, Website	1
2.3	Email - Competitive Intelligence – Footprinting through Social Engineering	2

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.4	Foot printing Tools - Network Scanning Concepts	1
2.5	Port-Scanning Tools- Scanning Techniques	2
2.6	Scanning Beyond IDS and Firewall	1
3	**Enumeration and Vulnerability Analysis**	
3.1	Enumeration Concepts - NetBIOS Enumeration	1
3.2	SNMP, LDAP, NTP, SMTP and DNS Enumeration	1
3.3	Vulnerability Assessment Concepts	2
3.4	Desktop and Server OS Vulnerabilities - Windows OS Vulnerabilities	2
3.5	Tools for Identifying Vulnerabilities in Windows	1
3.6	Linux OS Vulnerabilities- Vulnerabilities of Embedded Oss	2
4	**System Hacking**	
4.1	Hacking Web Servers - Web Application Components	1
4.2	Vulnerabilities	1
4.3	Tools for Web Attackers and Security Testers Hacking Wireless Networks	1
4.4	Components of a Wireless Network	1
4.5	Wardriving- Wireless Hacking	1
4.6	Tools of the Trade	1
5	**Network Protection Systems**	
5.1	Access Control Lists. - Cisco Adaptive Security Appliance Firewall	1
5.2	Configuration and Risk Analysis Tools for Firewalls and Routers	1
5.3	Intrusion Detection and Prevention Systems	1
5.4	Network Based and Host-Based IDSs and IPSs	1
5.5	Web Filtering	1
5.6	Security Incident Response Teams – Honeypots	1

Course Designer(s)

1.Ms. J.Mythili - mythili@ksrct.ac.in

60 CS E46	Big Data Frameworks	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the big data platform and its use cases
- To provide an overview of Apache Hadoop
- To provide HDFS Concepts and Interfacing with HDFS
- To understand Map Reduce jobs and provide hands on Hadoop Eco System Apply analytics on structured, unstructured Data.

Pre-requisites

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Should have knowledge of one Programming Language (Java preferably), Practice of SQL (queries and sub queries), exposure to Linux Environment.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify Big Data and its Business Implications.	Remember
CO2	Apply the components of Hadoop and Hadoop Eco-System and Process Data on Distributed File System	Apply
CO3	Manage Job Execution in Hadoop Environment	Apply
CO4	Develop Big Data Solutions using Hadoop Eco System and Analyze Infosphere BigInsights Big Data Recommendations.	Analyze
CO5	Apply Machine Learning Techniques using R.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	2	1	-	-	-	3	2	2	-	**3**	3	3	-
CO2	3	3	3	2	3	-	-	-	3	1	-	-	3	3	-
CO3	3	2	3	3	-	3	-	2	-	-	2	**3**	3	3	-
CO4	2	2	2	2	-	-	-	-	3	1	-	-	3	3	-
CO5	2	1	1	3	-	3	-	1	3	2	-	-	3	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	**2**	
Remember	10	10	10
Understand	35	15	35
Apply	15	15	35
Analyse		20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

CHAIRMAN
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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E46 – Big Data Frameworks								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction To Big Data and Hadoop* Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere Big Insights and Big Sheets.	**[9]**
HDFS(Hadoop Distributed File System)* The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.	**[9]**
Map Reduce* Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features	**[9]**
Hadoop Eco System* Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction	**[8]**
Data Analytics with R* Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering - Big Data Analytics with BigR.	**[9]**
Total Hours:	**45**
Text Book(s):	
1. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2021.	
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2020.	
Reference(s):	
1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2020.	
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2020)	
3. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2021), Oracle press.	
4. Anand Rajaraman and Jefrey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2021.	

***SDG 9 – Industry Innovation and Infrastructure**

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Types of Digital Data	1
1.2	Introduction to Big Data	1
1.3	Big Data Analytics	1
1.4	History of Hadoop, Apache Hadoop	1
1.5	Analysing Data with Unix tools	1
1.6	Analysing Data with Hadoop	1
1.7	Hadoop Streaming, Hadoop Echo System	1
1.8	IBM Big Data Strategy	1
1.9	Introduction to Infosphere BigInsights and Big Sheets	1
2.0	**HDFS(Hadoop Distributed File System)**	
2.1	The Design of HDFS	1
2.2	HDFS Concepts	1
2.3	Command Line Interface	1
2.4	Hadoop file system interfaces	1
2.5	Data flow	1
2.6	Data Ingest with Flume and Scoop and Hadoop archives	1
2.7	Hadoop I/O: Compression	1
2.8	Serialization	1
2.9	Avro and File-Based Data structures	1
3.0	**Map Reduce**	
3.1	Anatomy of a Map Reduce Job Run	1
3.2	Failures	1
3.3	Job Scheduling	2
3.4	Shuffle and Sort	1
3.5	Task Execution	1
3.6	Map Reduce Types and Formats	1
3.7	Map Reduce Features	2
4.0	**Hadoop Eco System**	
4.1	Pig : Introduction to PIG	1
4.2	Execution Modes of Pig, Comparison of Pig with Databases	1
4.3	Grunt, Pig Latin, User Defined Functions	1
4.4	Data Processing operators	1
4.5	Hive : Hive Shell, Hive Services	2
4.6	Hive Metastore, Comparison with Traditional Databases	1
4.7	HiveQL, Tables, Querying Data and User Defined Functions	1
4.8	Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS	1
4.9	Big SQL : Introduction	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

5.0	**Data Analytics with R**	
5.1	Machine Learning : Introduction	1
5.2	Supervised Learning	2
5.3	Unsupervised Learning	2
5.4	Collaborative Filtering	1
5.5	Big Data Analytics with BigR	3

Course Designer(s)

1. Mr.R.Baskar - baskar@ksrct.ac.in

60 CS E47	Advanced .NET	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To gain knowledge in object-oriented concepts in C#
- To gain the fundamental skills of Model-View-Controller (MVC) in ASP.NET Core
- To understand the concepts of ASP.NET Core Web Application using Razor Pages
- To implement data manipulation using Razor pages
- To enhance the knowledge of Real-time Communication using C#

Pre-requisites

- C# and .NET

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the Object-Oriented concepts in C#	Understand
CO2	Integrate the concept of MVC in ASP.NET Core platform	Apply
CO3	Develop web pages using ASP.NET Core platform	Apply
CO4	Implement the data manipulation concept using Razor Pages	Apply
CO5	Implement the concept of Real-time Communication using C#	Apply

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	-	-	-	-	-	-	-	-	2	3	-	-
CO2	3	3	3	-	3	-	-	-	-	-	-	3	3	-	-
CO3	3	3	2	-	3	-	-	-	2	2	2	3	3	-	-
CO4	3	3	2	-	3	-	-	-	2	2	2	3	3	-	-
CO5	3	3	3	-	3	-	-	-	2	2	2	3	3	-	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS E47 - Advanced .NET

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Object-Oriented Programming in C#: Introduction to C#, Classes–Objects –Inheritance– Methods –Polymorphism –Interfaces – Operator Overloading – Delegates –Events–Errors–Exceptions–Collections–Managing File system.	[9]
Model-View-Controller (MVC) in ASP.NET Core:* Introduction to MVC – Setting up an ASP.NET Core MVC Website – MVC Routing – Controllers and Actions –Model – Views – Parameters Passing – View Helpers – Model Validation.	[9]
ASP.NET Core Web Application using Razor Pages:* Introduction to ASP.NET Core Web Application – Environment Setup – Project Layout – Static and Default Files - Enabling and Defining Razor Pages – Shared Layouts – Using code-behind files.	[9]
Data Manipulation using Razor Pages:* Introduction to ADO.NET-Database connectivity concept using ADO.NET – Connection Class with Authentication – Command Class – DataReader Class –DataAdapter Class – DataSet – OnGet –OnPost – OnPostDelete – OnPostEdit – OnPostView – REST API – Model and Controller for REST API.	[9]
Real-time Communication Limitations of traditional web communication - SignalR - Setting Up a SignalR Project - SignalR Hubs - Sending and Receiving Messages - Connection Management - Dependency Injection with SignalR - Building Real-Time Applications with SignalR.	[9]
Total Hours:	**45**

Text Book(s):

1.	Mark J. Price, “C# 8.0 and .NET Core 3.0 – Modern Cross-Platform Development”,4th Edition, Packt Publishing Limited, 2019.
2.	Dino Esposito, “Programming ASP.NET Core”, 1st Edition, Pearson Education Inc., 2018.

Reference(s) :

1.	https://docs.microsoft.com/en-us/aspnet/core/
2.	Christian Nagel, “Professional C# 7 and .NET Core 2.0”, 1st Edition, Wiley Publication, 2018.

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.	Andrew Troelsen Phil Japikse," Pro C# 8 with .NET Core 3: Foundational Principles and Practices in Programming", Apress, 2020.
4.	Jon Skeet," C# in Depth",Fourth Edition, 2019.

*SDG 4 – Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Object-Oriented Programming in C#**	
1.1	Introduction to C#,	1
1.2	Classes–Objects –Inheritance	2
1.3	Methods –Polymorphism	1
1.4	Interfaces –Operator Overloading	1
1.5	Delegates –Events–Errors	2
1.6	Exceptions–Collections	1
1.7	Managing File system	1
2.0	**Model-View-Controller (MVC) in ASP.NET Core**	
2.1	Introduction to MVC	1
2.2	Setting up an ASP.NET Core MVC Website	1
2.3	MVC Routing – Controllers and Actions	2
2.4	Model – Views	2
2.5	Parameters Passing	1
2.6	View Helpers – Model Validation	2
3.0	**ASP.NET Core Web Application using Razor Pages**	
3.1	Introduction to ASP.NET Core Web Application	2
3.2	Environment Setup – Project Layout	2
3.3	Static and Default Files	1
3.4	Shared Layouts	2
3.5	Using code-behind files	2
4.0	**Data Manipulation using Razor Pages**	
4.1	Introduction to ADO.NET-Database connectivity concept using ADO.NET	2
4.2	Connection Class with Authentication	2
4.3	Command Class – DataReader Class	1
4.4	Data Adapter Class – DataSet	1
4.5	OnGet –OnPost OnPostDelete – OnPostEdit	2

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.6	OnPostView – REST API –Model and Controller for REST API.	1
5.0	**Real-time Communication**	
5.1	Limitations of traditional web communication	2
5.2	SignalR - Setting Up a SignalR Project	3
5.3	SignalR Hubs - Sending and Receiving Messages	2
5.4	Connection Management - Dependency Injection with SignalR	2
5.5	Building Real-Time Applications with SignalR	

Course Designer(s)

1. Dr. P. Kaladevi - kaladevi@ksrct.ac.in

60 CS E48	Cyber Security	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the cybercrime and its classification
- To impart the knowledge of cyber security challenges in modern devices
- To provide an ability to explore the tools and methods used in cybercrime
- To implement the various mobile platform security models
- To apply different mobile security testing in the mobile app development lifecycle

Pre-requisites

 Computer Networks

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic concepts of Cybercrime	Understand
CO2	Explore the cyber security challenges in modern devices	Understand
CO3	Interpret the tools and methods used in cybercrime	Understand
CO4	Implement different mobile platform security models	Apply
CO5	Apply different mobile security testing in the mobile app development lifecycle	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	-	-	2	2	-	2	-	-	-	2	2	-	-
CO2	2	3	-	-	2	2	-	2	-	-	-	2	2	-	-

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO3	2	3	-	-	2	2	-	2	-	-	-	2	2	-	-
CO4	-	2	-	-	2	2	-	-	-	-	-	2	2	-	-
CO5	-	2	-	-	2	2	-	-	-	-	-	2	2	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	10	20
Understand	40	30	50
Apply	-	20	30
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS E48 – Cyber Security

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

INTRODUCTION TO CYBERCRIME* Cybercrime- definition and origins of the word- Cybercrime and information security - Classifications of cybercrime- Cybercrime and the Indian ITA 2000 - A Global Perspective on cybercrimes- Cloud Computing-Proliferation of Mobile and Wireless Devices- Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era.	[9]
CYBER SECURITY CHALLENGES IN MODERN DEVICES** Security Challenges Posed by Mobile Devices- Registry Settings for Mobile Devices Authentication Service Security- Attacks on Mobile/Cell Phones - Mobile Devices: Security Implications for Organizations- Organizational Measures for Handling MobileDevices-Related Security Issues - Organizational Security Policies and Measures in Mobile Computing Era, Laptops.	[9]
TOOLS AND METHODS** Tools and Methods Used in Cybercrime, Proxy Servers and Anonymizers- Phishing Password Cracking - Key loggers and Spywares, - Virus and Worms - Steganography – DoS and DDoS Attacks -SQL Injection, Buffer Over Flow - Attacks on Wireless Networks - Phishing, Identity Theft (ID Theft) - The Legal Perspectives - Cyberlaw: The Indian Context - The Indian IT Act - Introduction to Security Audit.	[9]
MOBILE PLATFORM SECURITY MODELS** Android – iOSMobile platform security models – Detecting Android malware in Android markets.	[9]
MOBILE SECURITY TESTING** Mobile platform internals – Security testing in the mobile app development lifecycle – Basic static and dynamic security testing – Mobile app reverse engineering and tampering– Assessing software protections.	[9]

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

	Total Hours	45
Text Book(s):		
1.	Nina Godbole, Sunit Belapure, “Cyber Security”, Wiley India, New Delhi 2012.	
2.	Harish Chander, “cyber laws & IT protection”, PHI learning pvt.ltd, 2012.	
Reference(s):		
1.	Dhiren R Patel, “Information security theory &practice” ,PHI learning pvt ltd,2010	
2.	MS.M.K.Geetha & Ms. Swapne Raman,C”yber Crimes and Fraud Management”, MACMILLAN,2012.	
3.	Mayank Bhusan, Rajkumar Singh Rathore, Aatif Jamshed, “Fundamental of Cyber Security: Principles, Theory and Practices”, BPB Publishers, Delhi,2017.	
4.	William Stallings, “Network Security Essentials: Applications and Standards”, Prentice Hall, 4th edition, 2010.	

*SDG 4 – Quality Education

**SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**INTRODUCTION TO CYBERCRIME**	
1.1	Cybercrime- definition and origins of the word	1
1.2	Cybercrime and information security	1
1.3	Classifications of cybercrime	1
1.4	Cybercrime and the Indian ITA 2000	1
1.5	A Global Perspective on cybercrimes	1
1.6	Cloud Computing	2
1.7	Proliferation of Mobile and Wireless Devices	1
1.8	Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era.	1
2.0	**CYBER SECURITY CHALLENGES IN MODERN DEVICES**	
2.1	Security Challenges Posed by Mobile Devices	2
2.2	Registry Settings for Mobile Devices	2
2.3	Authentication Service Security - Attacks on Mobile/Cell Phones	1
2.4	Mobile Devices: Security Implications for Organizations	1
2.5	Organizational Measures for Handling Mobile-Devices	1
2.6	Related Security Issues - Organizational Security Policies and Measures in Mobile Computing Era, Laptops.	2

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.0	**TOOLS AND METHODS**	
3.1	Tools and Methods Used in Cybercrime, Proxy Servers and Anonymizers	1
3.2	Phishing -Password Cracking	2
3.3	Key loggers and Spywares, - Virus and Worms	1
3.4	Steganography – DoS and DDoS Attacks	2
3.5	SQL Injection, Buffer Over Flow - Attacks on Wireless Networks	1
3.6	Phishing, Identity Theft (ID Theft) - The Legal Perspectives	1
3.7	Cyberlaw: The Indian Context - The Indian IT Act. Introduction to Security Audit	1
4.0	**MOBILE PLATFORM SECURITY MODELS**	
4.1	Android – iOSMobile platform security models	4
4.2	Detecting Android malware in Android markets	5
5.0	**MOBILE SECURITY TESTING**	
5.1	Mobile platform internals	2
5.2	Security testing in the mobile app development lifecycle	2
5.3	Basic static and dynamic security testing	2
5.4	Mobile app reverse engineering and tampering	2
5.5	Assessing software protections.	1

Course Designer(s)

1. Ms. B. Janani – janani@ksrct.ac.in

60 CS E51	Social Network Analysis	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the concept of semantic web and related applications
- To learn knowledge representation using ontology
- To understand the various communities in social web and related applications
- To describe the trust network analysis
- To learn visualization of social networks

Pre-requisites

- Mathematical Foundations, Statistics and Data Analysis, Computer Networks

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explore social network data and social relations.	Understand
CO2	Model social network data and understand its logical relations.	Apply

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO3	Analyze complex network structures of the web for information retrieval.	Analyze
CO4	Mine user behaviors in social networks.	Apply
CO5	Simulate network dynamics based on social network models.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	3	2	3	3	-	1	-	-	-	1	3	3	-
CO2	2	3	3	2	3	3	-	1	-	-	-	1	3	3	-
CO3	2	3	3	2	3	3	-	1	-	-	-	1	3	3	-
CO4	2	3	3	2	3	3	-	1	-	-	-	1	3	3	-
CO5	2	3	3	2	3	3	-	1	-	-	-	1	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	25	15	30
Apply	25	15	30
Analyse	-	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS E51 – Social Network Analysis

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Introduction to Social Network Analysis* Semantic Web and Social Web, Limitations of the current we, Connection between the semantic web and social networks, Key concepts, Electronic sources for network data (e.g., discussion networks, blogs, online communities), Applications of social network analysis	**[8]**

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Network Data Representation and Measures * Graph Theory Basics, Nodes, edges, and graphs, Types of graphs (directed, undirected, weighted), Degree centrality, closeness centrality, and betweenness centrality, Social Network Data Representation, Representing social individuals and relationships, Adjacency matrices and edge lists, Visualization techniques	**[9]**
Community Detection and Structural Analysis* The Structure of the World Wide Web, Bow-Tie Structure of the Web, Link Analysis and Web Search Algorithms, Link Analysis using Hubs and Authorities, PageRank Algorithm, Applications of Web Structure Analysis, Community Detection Algorithms, Structural Balance, Triads. Evaluation Metrics for Clustering and Community Detection.	**[10]**
Social Network Data Mining * Social Influence Models and Homophily, Threshold Models and Diffusion Processes, Influence Maximization and Information Cascades, Viral Marketing and Rumor Spreading, Data Collection and Preprocessing ,Opinions and Sentiments – Mining, Case Studies and Real-world Applications- Sentiment Analysis on a set of Movie Reviews.	**[9]**
Privacy, Ethics, and Advanced Network Analysis * Privacy and Ethical Considerations, Privacy risks in social networks, Anonymization techniques, Ethical implications of network analysis. Network Dynamics and Growth Models, Advanced Topics - Temporal networks, Multiplex networks, Dynamic community detection, Link prediction.	**[9]**
Total Hours:	**45**

Text Book(s):	
1.	Tanmoy Chakraborty, “Social Network Analysis”, Wiley, 2021.
2.	Robert A. Hanneman and Mark Riddle, “Introduction to social network methods”, University of California, 2005.
Reference(s):	
1.	Charles Kadushin, “Understanding Social Networks: Theories, Concepts, and Findings”, 2011.
2.	Borgatti, S. P., Everett, M. G., & Johnson, J. C., “Analyzing social networks”, SAGE Publications Ltd, First Edition, 2013.
3.	John Scott, “Social Network Analysis: A Handbook”, SAGE Publications Ltd, Second Edition, 2000.
4.	Stanley Wasserman, Katherine Faus, “Social Network Analysis: Methods and Applications”, Cambridge University Press, 2012.

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Social Network Analysis**	
1.1	Semantic Web and Social Web	1
1.2	Limitations of the current web	1
1.3	Connection between the semantic web and social networks	1
1.4	Key concepts	1

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Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.5	Electronic sources for network data	2
1.6	Applications of social network analysis	2
2.0	**Network Data Representation and Measures**	
2.1	Graph Theory Basics	1
2.2	Nodes, edges, and graphs	1
2.3	Types of graphs (directed, undirected, weighted)	1
2.4	Degree centrality, closeness centrality, and betweenness centrality	1
2.5	Social Network Data Representation	2
2.6	Representing social individuals and relationships	1
2.7	Adjacency matrices and edge lists	1
2.8	Visualization techniques	1
3.0	**Community Detection and Structural Analysis**	
3.1	The Structure of the World Wide Web	1
3.2	Bow-Tie Structure of the Web	1
3.3	Link Analysis and Web Search Algorithms	1
3.4	Link Analysis using Hubs and Authorities	1
3.5	PageRank Algorithm	1
3.6	Applications of Web Structure Analysis	1
3.7	Community Detection Algorithms	1
3.8	Structural Balance	1
3.9	Triads	1
3.10	Evaluation Metrics for Clustering and Community Detection	1
4.0	**Social Network Data Mining**	
4.1	Social Influence Models and Homophily	1
4.2	Threshold Models and Diffusion Processes	1
4.3	Influence Maximization and Information Cascades	2
4.4	Viral Marketing and Rumor Spreading	1
4.5	Data Collection and Preprocessing	1
4.6	Opinions and Sentiments – Mining	2
4.7	Case Studies and Real-world Applications	1
5.0	**Privacy, Ethics, and Advanced Network Analysis**	
5.1	Privacy and Ethical Considerations	1
5.2	Privacy risks in social networks	1
5.3	Anonymization techniques	1
5.4	Ethical implications of network analysis	1
5.5	Network Dynamics and Growth Models	1
5.6	Advanced Topics - Temporal networks, Multiplex networks, Dynamic community detection, Link prediction	3
5.7	Hands-On Activity: Discuss privacy challenges and propose solutions	1

Course Designer(s)

1. Dr.P.Kaladevi - kaladevi@ksrct.ac.in

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS E52	Agile Methodology	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn the fundamentals of agile environment.
- To impart knowledge on agile framework using Scrum.
- To learn and deploy testing models of Agile.
- To acquire knowledge on Drive development with To enhance our knowledge on recent trends of Agile

Test Driven Development.

Pre-requisites

Basic Knowledge of software Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the background and driving forces for taking an Agile approach to software development	Understand
CO2	Analyse the business value of adopting Agile approaches	Analyse
CO3	Comprehend the Agile development practices	Understand
CO4	Drive development with unit tests using Test Driven Development	Apply
CO5	Apply design principles and refactoring to achieve Agility.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3		3	-	-	-	-	3	1	-	-	-	3	2	-
CO2	-	3	-	-	-	-	2	-	-	-	-	-	3	2	-
CO3	-	-	-	-	-	-	-	-	-	-	-	3	3	2	-
CO4	-	-	-	-	-	-	-	2	-	-	-	-	3	2	-
CO5			3	3	-	-	-	-	-	-	-	3	3	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	30	40
Apply	20	20	20
Analyse	10	-	20
Evaluate	-	-	-
Create	-	-	-

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS E52 - Agile Methodology

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Fundamentals of Agile * Theories for Agile Management – Agile Software Development – Traditional Model Vs. Agile Model – Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile-Teams – Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values.	**[9]**
Agile Scrum Framework* Lean Production – SCRUM, Crystal, Feature Driven Development – Adaptive Software Development – Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.	**[9]**
Agile Testing * The Agile lifecycle and its impact on testing, Test driven development– Acceptance tests and verifying stories, writing a user acceptance test, Developing effective test suites, Continuous integration, Code refactoring. Risk based testing, Regression tests, Test automation.	**[9]**
Agile Software Design and Development** Impact of Agile Processes in Requirements Engineering –Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable-Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.	**[9]**
Industry Trends ** Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance – Agile Approach in Global Software Development- Agile AI and Machine Learning Integration- Overview of Agile Tools.	**[9]**
Total Hours:	**45**

Text Book(s):

1.	Orit Hazzan, Yael Dubinsky, “Agile Software Engineering”, Springer International Edition, 2015.
2.	Kevin C. Desouza, “Agile Information Systems: Conceptualization, Construction, and Management”, Butter worth Heinemann, United Kingdom, First Edition, 2007.

Reference(s):

1.	Robert C. Martin, “Agile Software Development, Principles, Patterns, and Practices”, AlanApt Series, 2011.
2.	Lisa Crispin, Janet Gregory, “Agile Testing: A Practical Guide for Testers and Agile Teams”, International edition, Addison Wesley, 2009.
3.	David J. Anderson and Eli Schragenheim, “Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results”, Prentice Hall, New Delhi, First Edition, 2003.

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.	Gayathri Mohan, “Full Stack Testing: A Practical Guide for Delivering High Quality Software”, Grayscale Indian Edition,14 June 2022
5.	Craig Larman, “Agile and Iterative Development: A Managers Guide”, Addison - Wesley, 2004.
6.	Rex Black, Jamie Mitchell, ”Advanced Software Testing V 3”, 2e: Guide to the ISTQB Advanced Certification as an Advanced Technical Test Analyst, April 2015.
Online Courses	
1.	Agile Fundamentals Ebook: A Complete Guide for Beginners”, https://agileken.com/agile-fundamentals-ebook
2.	nptel.ac.in/courses/106101061/26.
3.	“Agile Software Development”, https://www.edx.org/course/agile-software-development Accessed on 2021.
4.	“Agile Software Development”, https://www.coursera.org/learn/agile-software-development Accessed on 2021

*SDG 9 – Industry Innovation and Infrastructure
**SDG: 8 - Sustainable Economic growth

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Fundamentals of Agile**	
1.1	Pre-requestie-Software Engineering	1
1.2	Theories for Agile Management	1
1.3	Agile Software Development	1
1.4	Traditional Model Vs. Agile Model, Classification of Agile Methods	1
1.5	Agile Manifesto and Principles	1
1.6	Agile Project Management, Agile Team Interactions	1
1.7	Ethics in Agile-Teams – Agility in Design	1
1.8	Testing – Agile Documentations	1
1.9	Agile Drivers, Capabilities and Values	1
2.0	**Agile Scrum Framework**	
2.1	Lean Production	1
2.2	SCRUM- Agile Manifesto, Twelve Practices of XP, Scrum Practices, Applying Scrum. Need of scrum	1
2.3	Working of scrum	1
2.4	Scrum and the Organization, scrum values	1
2.5	Advanced Scrum Applications	1
2.6	Crystal, Feature Driven Development	1
2.7	Adaptive Software Development	1
2.8	Extreme Programming: Method Overview	1
2.9	Lifecycle – Work Products, Roles and Practices	1
3.0	**Agile Testing**	
3.1	The Agile lifecycle and its impact on testing	1

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.2	Test driven development	1
3.3	Acceptance tests and verifying stories	1
3.4	Writing a user acceptance test	1
3.5	Developing effective test suites	1
3.6	Continuous integration	1
3.7	Code Refactoring	1
3.8	Risk based testing	1
3.9	Regression tests, Test automation	1
4.0	**Agile Software Design and Development**	
4.1	Impact of Agile Processes in Requirements Engineering	1
4.2	Current Agile Practices, Variance	1
4.3	Overview of RE Using Agile – Managing Unstable	1
4.4	Requirements – Requirements Elicitation	1
4.5	Agile Requirements Abstraction Model	1
4.6	Requirements Management in Agile Environment,	1
4.7	Agile Requirements Prioritization	1
4.8	Agile Requirements Modeling and Generation	1
4.9	Concurrency in Agile Requirements Generation	1
5.0	**Industry Trends**	
5.1	Agile Product Development	1
5.2	Agile Metrics	1
5.3	Feature Driven Development (FDD)	1
5.4	Financial and Production Metrics in FDD	1
5.5	Agile Approach to Quality Assurance	1
5.6	Agile Approach in Global Software Development	1
5.7	Agile AI and Machine Learning Integration	2
5.8	Overview of Agile Tools	1

Course Designer(s)

1. Dr.B.G.Geetha - geetha@ksrct.ac.in

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K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

60 CS E53	Multimedia Computing	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To provide the knowledge on elements of multimedia system
- To understand multimedia tools
- To understand multimedia operating systems
- To know about Multimedia Communication Systems
- To understand the Data Compression and Multimedia Applications

Pre-requisites

- Operating System

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand different elements of multimedia system, storage media for multimedia systems and animation	Understand
CO2	Analyse multimedia editing tools for audio, video, image and analyse linking multimedia objects	Analyse
CO3	Outline Real-time, process, resource management and examine different Database management system for multimedia	Apply
CO4	Predict multimedia communication subsystems and generate multimedia synchronization reference model	Apply
CO5	Compare different data compression techniques and gain knowledge about Multimedia application	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	-	3	2	-	-	1	3	1	2	2	2	-
CO2	2	2	2	-	3	2	-	-	2	3	2	2	2	2	-
CO3	3	2	2	-	2	2	-	-	2	3	2	2	2	-	-
CO4	3	2	2	-	1	2	-	-	1	3	1	2	-	-	-
CO5	3	2	2	-	1	2	-	-	1	3	1	2	-	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	20

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Apply	20	30	40
Analyse	10	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E53 – Multimedia Computing								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Introduction to Multimedia Elements of multimedia system – Need and aspects of multimedia - Information units. Sound - Audio file formats – MIDI –Images - Computer Image Processing - Principles of animation - Animation techniques - Creating animated scenes – Video -Basic concepts - Video Capture - Recording format - Storage for multimedia - CD Technologies - Multimedia Workstations	[9]
Multimedia Tools Basic tools - Image-editing tool - Painting and drawing tools –Sound editing programs Video formats - Linking multimedia objects – OLE -presentation tools - authoring tools.	[9]
Multimedia Operating Systems Introduction - Real Time - Resource Management - Process Management - File Systems - Database Systems - Multimedia Database Management System - Characteristics of an MDBMS - Data Analysis - Data Structure - Operations on Data -Integration in a Database Model.	[9]
Multimedia Communication Systems* **Application Subsystem - Transport Subsystem – Synchronization - Introduction - Notion of Synchronization** - Presentation Requirements - A Reference Model for Multimedia Synchronization - Synchronization in distributed environment.	[9]
Data Compression and Multimedia Applications* **Source entropy and hybrid coding – JPEG – MPEG - H.261 - DVI. Video conferencing - Tele conferencing – Tele services –messaging services – retrieval services – Tele action services**	[9]
Total Hours:	**45**

Text Book(s):	
1.	Ralf Steinmetz, Klara Nahrstedt, "Multimedia: Computing, Communications and Applications", Pearson Education Asia, New Delhi, 2002.
2.	Tay Vaughan, “Multimedia: Making it work”, sixth edition, Tata McGraw Hill, New Delhi, 2002.
Reference(s):	
1.	Fred Halsall, “Multimedia Communication, Application Networks, Protocols and Standard”, fourth edition, Addison Wesley, New Delhi, 2001.
2.	John F.Koegal Buford, “Multimedia Systems”, Pearson Educational Asia, New Delhi, 2001.
3.	Ron, Goldberg, "Multimedia Producer's Bible", fifth edition, Comdex Computer Publishing, New Delhi, 1996.
4.	Tay Vaughan, “Multimedia: Making it work”, sixth edition, Tata McGraw Hill, New Delhi, 2002.

*SDG 4- Quality Education

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

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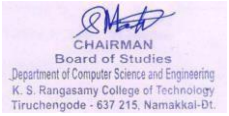
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1	**Introduction to Multimedia**	
1.1	Elements of multimedia system	1
1.2	Need and aspects of multimedia - Information units	1
1.3	Sound - Audio file formats – MIDI	1
1.4	Images - Computer Image Processing - Principles of animation	2
1.5	Animation techniques - Creating animated scenes	1
1.6	Video -Basic concepts - Video Capture - Recording format	1
1.7	Storage for multimedia - CD Technologies	1
1.8	Multimedia Workstations	1
2	**Multimedia Tools**	
2.1	Basic tools - Image-editing tool	1
2.2	Painting and drawing tools	1
2.3	Sound editing programs	1
2.4	Video formats	2
2.5	Linking multimedia objects-OLE	2
2.6	presentation tools	1
2.7	Authoring tools.	1
3.0	**Multimedia Operating Systems**	
3.1	Process Management- File Systems	2
3.2	Database Systems - Multimedia Database Management System	2
3.3	Characteristics of an MDBMS	2
3.4	Data Analysis - Data Structure	1
3.5	Operations on Data -Integration in a Database Model	2
4.0	**Inter Procedural Optimization**	
4.1	Designing Web Interfaces	2
4.2	Drag and Drop	1
4.3	Direct Selection	1
4.4	Contextual tools	1
4.5	Overlays, Inlays	1
4.6	Virtual Pages	1
4.7	Process Flow	1
4.8	Case Studies	1
5	**Data Compression and Multimedia Applications**	
5.1	Source entropy and hybrid coding	2
5.2	JPEG – MPEG	1



5.3	H.261 - DVI. Video conferencing	2
5.4	Tele conferencing – Tele services	2
5.5	Messaging services – retrieval services	1
5.6	Tele action services	1

Course Designer(s)

1. Dr. P.Senthilraja - senthilraja@ksrct.ac.in

60 CS E54	Advanced Algorithm and Design	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand algorithm design, probabilistic analysis and amortized analysis of algorithms To know Divide and Conquer, Dynamic programming and Greedy Algorithms techniques.
- To study Graph algorithms and Matrix operations.
- To apply multithreaded algorithms and linear programming and polynomial multiplication using Fast Fourier Transforms.
- To understand string matching, computational geometry, Notions of NP-Completeness and approximation algorithms

Pre-requisites

- Data Structures and Algorithms

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Design and analyze algorithms using divide and conquer	Analyze
CO2	Design and analyze algorithms using dynamic programming, greedy algorithms	Analyze
CO3	Understand sorting algorithms based on a comparison-network model of computation	Understand
CO4	Solve problems using multithreaded algorithms and linear programming approach	Apply
CO5	Apply suitable string matching algorithms and Computational geometry algorithms	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	-	-	-	-	-	1	-	3	3	2
CO2	3	3	2	3	2	-	-	-	2	-		-	3	3	2
CO3	3	3	3	-	2	-	1	-	2	-	2	2	3	3	2
CO4	3	3	3	2	3	-	-	-	2	1	2	-	3	3	3

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Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO5	3	3	3	-	3	-	-	-	-	1	2	-	3	3	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	20	40	60
Analyse	20	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS E54 - Advanced Algorithm and Design

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

INTRODUCTION* Role of Algorithms – Analyzing algorithms – Designing algorithms – Growth of functions – Divide and Conquer – Probabilistic analysis – Randomized algorithms.	**[9]**
DESIGN AND ANALYSIS * Dynamic programming: Rod cutting, Matrix-chain multiplication, Elements of dynamic programming - Painting fence algorithm – Greedy Algorithms: An activity-selection problem, Elements of the greedy strategy, water connection problem – Amortized Analysis.	**[9]**
SORTING NETWORKS* Introduction to sorting network - Comparison networks, Zero-one principle, bitonic sorting networks, Merging Network, Sorting network.	**[9]**
MULTITHREADED AND LINEAR PROGRAMMING * Multithreaded algorithms: Multithreaded matrix multiplication, Multithreaded merge sort – Matrix operations: Solving systems of linear equations, Inverting matrices, Symmetric positive- definite matrices and least-squares approximation – Linear programming – Polynomials and FFT.	**[9]**
STRING MATCHING AND COMPUTATIONAL GEOMETRY ALGORITHMS * String matching: Naive string-matching algorithm, Rabin-Karp algorithm, String matching with finite automata, Knuth-Morris-Pratt algorithm– Computational Geometry: Linesegment properties - NP-Completeness and reducibility – Vertex-cover problem.	**[9]**
Total Hours:	**45**
Text Book(s):	

1.	Thomas H. Cormen, Charles E. Leiseron, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Third Edition, PHI learning Pvt. Ltd., 2011.

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, “Fundamentals of Computer Algorithms”, Galgotia Publications Pvt. Ltd., 2008.
Reference(s):	
1.	Michael R. Garey, D. S. Johnson, “Computers and Intractability: A Guide to the Theory of NPCompleteness”, W. H. Freeman, 1979.
2.	Aho. A.V., Hopcroft. J.E. and Ullman .J.D., “The Design and Analysis of Algorithms”, AddisonWesley, 1974

*SDG 4- Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**INTRODUCTION**	
1.1	Role of Algorithms in Computing	1
1.2	Analyzing algorithms	1
1.3	Designing algorithms	2
1.4	Growth of functions	1
1.5	Divide and Conquer	1
1.6	Probabilistic analysis	1
1.7	Randomized algorithms	1
2.0	**DESIGN AND ANALYSIS**	
2.1	Dynamic programming: Rod cutting	1
2.2	Matrix-chain multiplication	2
2.3	Elements of dynamic programming	1
2.4	Painting fence algorithm	1
2.5	Greedy Algorithms: An activity- selection problem	1
2.6	Elements of the greedy strategy	1
2.7	Water connection Problem	1
2.8	Amortized Analysis.	1
3.0	**SORTING NETWORK**	
3.1	Introduction to sorting network	1
3.2	Comparison networks	2
3.3	Zero-one principle	2
3.4	Bitonic sorting networks	1
3.5	Merging Network	1
3.6	Sorting network	2
4.0	**MULTITHREADED AND LINEAR PROGRAMMING**	

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

4.1	Multithreaded algorithms: Multithreaded matrix multiplication	1
4.2	Multithreaded merge sort	1
4.3	Matrix operations: Solving systems of linear equations	1
4.4	Inverting matrices	1
4.5	Symmetric positive	1
4.6	definite matrices and least-squares approximation	2
4.7	Linear programming	1
4.8	Polynomials and FFT.	1
5.0	**STRING MATCHING AND COMPUTATIONAL GEOMETRY ALGORITHMS**	
5.1	String matching: Naive string-matching algorithm	1
5.2	Rabin-Karp algorithm	1
5.3	String matching with finite automata,	2
5.4	Knuth-Morris-Pratt algorithm	1
5.5	Computational Geometry	1
5.6	NP-Completeness	1
5.7	Approximation algorithms	2

Course Designer(s)

1. Mr.P.Thangamariappan – thangamariappan@ksrct.ac.in

60 CS E55	Information Security	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To know about information security and security model
- To learn about security investigation
- To understand security analysis
- To describe the logical design of the security
- To describe the physical design of the security

Pre-requisites

- Cryptography and Network Security

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand about information security and security model	Understand
CO2	Describe the information security issues and policies	Understand
CO3	Explain about risk management and access control mechanisms	Understand

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

CO4	Apply the logical design techniques for information security	Apply
CO5	Apply the physical design techniques to provide information security	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	3	-	-	-	-	-	1	-	3	3	-
CO2	3	3	-	-	2	-	-	-	2	-	-	-	3	3	-
CO3	3	3	-	-	2	-	-	-	2	-	2	2	3	3	-
CO4	3	3	-	-	3	-	-	-	2	1	2	-	3	3	-
CO5	3	3	-	-	3	-	-	-	-	1	2	-	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	10	20
Understand	40	30	20
Apply	-	20	60
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

K.S.Rangasamy College of Technology–Autonomous R2022							
60 CS E55 – Information Security							
B.E. Computer Science and Engineering							
Semester	Hours/Week			Total hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

INTRODUCTION * History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.	**[9]**
SECURITY INVESTIGATION* Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues - An Overview of Computer Security - Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.	**[9]**
SECURITY ANALYSIS * Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk - Systems: Access Control Mechanisms, Information Flow and Confinement Problem.	**[9]**
LOGICAL DESIGN* Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity.	**[8]**
PHYSICAL DESIGN* Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.	**[9]**
Total Hours	**45**

Text book(s):	
1.	Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, 2003
2.	Nadkarni Sanil, “Fundamentals of Information Security”, BPB Publisher, 2020.
Reference(s):	
1.	Micki Krause, Harold F. Tipton, “Handbook of Information Security Management”, Vol 1-3 CRC Press LLC, 2004.
2.	Stuart McClure, Joel Scrambray, George Kurtz, “Hacking Exposed”, Tata McGraw- Hill, 2003
3.	Matt Bishop, “Computer Security Art and Science”, Pearson/PHI, 2002.
4.	Rubeena Mohammed, “Information Security”, Notion Press, 2022.

*SDG 9 – Industry, innovation and Infrastructure

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction**	
1.1	History, What is Information Security	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

1.2	Critical Characteristics of Information	1
1.3	NSTISSC Security Model	1
1.4	Components of an Information System	1
1.5	Securing the Components	1
1.6	Balancing Security and Access	1
1.7	SDLC	2
1.8	The Security SDLC	1
2	**SECURITY INVESTIGATION**	
2.1	Need for Security, Business Needs	1
2.2	Threats, Attacks	1
2.3	Legal, Ethical and Professional Issues	1
2.4	An Overview of Computer Security	1
2.5	Access Control Matrix	1
2.6	Policy - Security policies	1
2.7	Confidentiality policies	1
2.8	Integrity policies	1
2.9	Hybrid policies	1
3	**SECURITY ANALYSIS**	
3.1	Risk Management	1
3.2	Identifying and Assessing Risk	2
3.3	Assessing and Controlling Risk	2
3.4	Systems: Access Control Mechanisms	2
3.5	Information Flow	1
3.6	Confinement Problem	1
4	**LOGICAL DESIGN**	
4.1	Blueprint for Security	1
4.2	Information Security Policy	1
4.3	Standards and Practices	1
4.4	ISO 17799/BS 7799	1
4.5	NIST Models	1
4.6	VISA International Security Model	2
4.7	Design of Security Architecture	1
4.8	Planning for Continuity	1
5	**PHYSICAL DESIGN**	
5.1	Security Technology	2
5.2	IDS	1
5.3	Scanning and Analysis Tools	1
5.4	Cryptography	2
5.5	Access Control Devices	1
5.6	Physical Security	1
5.7	Security and Personnel	1

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Course Designer(s)

1.Dr.K.Poongodi - poongodik@ksrct.ac.in

60 CS E56	Computer Vision	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To review image processing techniques for computer vision.
- To understand various features and recognition techniques.
- To learn about histogram and binary vision.
- Apply three-dimensional image analysis techniques.
- Study real world applications of computer vision algorithms

Pre-requisites

- Linear Algebra, Data Structures

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the low level processing of image and transformation techniques applied to images.	Understand
CO2	Describe the feature extraction, segmentation and object recognition methods.	Understand
CO3	Apply Histogram transform for detection of geometric shapes like line, ellipse and objects.	Apply
CO4	Illustrate 3D vision process and motion estimation techniques.	Apply
CO5	Apply vision techniques to real time applications.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		2	-	-	-	-	-	-	-	-	2	-	-	-
CO2	2		2	-	-	2	-	-	-	-	-	2	2	-	-
CO3	2	3	3	2	2	2	-	-	-	-	-	2	3	2	-
CO4	2	3	3	2	2	2	-	-	-	-	-	2	3	2	-
CO5	2	3	3	2	2	2	-	-	-	-	-	2	3	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	50	20	20
Apply	-	30	60
Analyse	-	-	-
Evaluate	-	-	-

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS E56 – Computer Vision								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Introduction Image Processing, Computer Vision ,What is Computer Vision - Low-level, Mid-level, High-level ; Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing.	**[9]**
Feature Extraction and Feature Segmentation Feature Extraction - Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space 69 Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT. Image Segmentation -Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation.	**[9]**
Images, Histograms, Binary Vision* Simple pinhole camera model – Sampling – Quantisation – Colour images – Noise – Smoothing – 1D and 3D histograms - Histogram/Image Equalisation - Histogram Comparison - Back-projection - k-means Clustering – Thresholding - Threshold Detection Methods - Variations on Thresholding - Mathematical Morphology – Connectivity.	**[9]**
3D Vision and Motion* Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – Introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion–spline-based motion- optical flow – layered motion.	**[9]**
Applications* Overview of Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing , Virtual Reality and Augmented Reality	**[9]**
Total Hours:	**45**

Text Book(s):	
1.	Forsyth D A,Ponce J, “Computer Vision: A Modern Approach”, Pearson Education, 2003.
2.	Richard Szeliski, “Computer Vision: Algorithms and Applications”, Springer Verlag London Limited,2011.
Reference(s):	
1.	Horn B K P, “Robot Vision”, McGraw-Hill.

Rev. No.4/w.e.f. 01.06.2024
Passed in BoS Meeting held on 24/05/2024
Approved in Academic Council Meeting held on 25/05/2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

2.	Simon J. D. Prince, “Computer Vision: Models, Learning, and Inference”, Cambridge University Press, 2012.
3.	Mark Nixon and Alberto S. Aquado, “Feature Extraction & Image Processing for Computer Vision”, Third Edition, Academic Press, 2012.
4.	Reinhard Klette, “Concise Computer Vision: An Introduction into Theory and Algorithms”, Springer Nature, 2014

***SDG: 4- Quality Education**

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**INTRODUCTION**	
1.1	Image Processing	1
1.2	What is Computer Vision - Low-level, Mid-level, High-level	1
1.3	Fundamentals of Image Formation	1
1.4	Transformation: Orthogonal	1
1.5	Euclidean, Affine, Projective	1
1.6	Fourier Transform	1
1.7	Convolution and Filtering	1
1.8	Image Enhancement, Restoration	1
1.9	Histogram Processing	1
2	**Feature Extraction and Feature Segmentation**	
2.1	Feature Extraction - Edges	1
2.2	Canny, LOG, DOG	1
2.3	Line detectors (Hough Transform), Corners	1
2.4	Harris and Hessian Affine, Orientation Histogram	1
2.5	SIFT, SURF, HOG, GLOH, Scale-Space 69 Analysis	1
2.6	Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT	1
2.7	Image Segmentation	1
2.8	Region Growing, Edge Based approaches to segmentation	1
2.9	Graph-Cut, Mean-Shift, MRFs, Texture Segmentation	1
3	**Images, Histograms, Binary Vision**	

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

3.1	Simple pinhole camera model	1
3.2	Sampling – Quantisation	1
3.3	Colour images – Noise – Smoothing	1
3.4	1D and 3D histograms - Histogram/Image Equalisation	1
3.5	Histogram Comparison - Back-projection	1
3.6	k-means Clustering	1
3.7	Thresholding - Threshold Detection Methods - Variations on Thresholding	2
3.8	Mathematical Morphology – Connectivity	1
4	**3D Vision and Motion**	
4.1	Methods for 3D vision – projection schemes	1
4.2	Shape from shading – photometric stereo	1
4.3	Shape from texture – shape from focus	1
4.4	Point-based representation – volumetric representations	1
4.5	3D object recognition – 3D reconstruction	1
4.6	Introduction to motion – triangulation – bundle adjustment	1
4.7	Translational alignment	1
4.8	Parametric motion–spline-based motion	1
4.9	Optical flow – layered motion	1
5	**Applications**	
5.1	Overview of Diverse Computer Vision Applications: Document Image Analysis	2
5.2	Biometrics	1
5.3	Object Recognition - Tracking	1
5.4	Medical Image Analysis	1
5.5	Content-Based Image Retrieval	1
5.6	Video Data Processing	1
5.7	Virtual Reality and Augmented Reality	2

Course Designer(s)

1. M. Varshana Devi- varshanadevi@ksrct.ac.in

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
K. S. Rangasamy College of Technology
Tiruchengode - 637 215, Namakkal-Dt.

61 CS L01	Object Oriented Programming	Category	L	T	P	Credit
		OE	2	0	2	3

Objectives

- To enable the students to learn how C++ supports object Oriented properties
- To create and use classes, objects, constructors and destructors for specific applications
- To learn how inheritance and virtual functions implement dynamic binding with polymorphism.
- To learn how to design and implement generic classes with C++ templates. To learn how to use exception handling in C++ programs

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recognize the principles of object-oriented problem solving and programming	Understand
CO2	Implement the concept of classes and objects	Apply
CO3	Analyze the concept of reusability and compile time polymorphism	Analyze
CO4	Recognize the concept of dynamic memory allocation and runtime polymorphism.	Apply
CO5	Identify the uses of generic programming and exception handling	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	2	-	-	-	2	-	2	-	3	-	-
CO2	3	3	3	-	2	-	-	-	2	-	2	-	3	-	-
CO3	2	2	3	-	2	-	-	-	2	-	2	-	3	-	-
CO4	2	2	3	-	2	-	-	-	-	-		-	3	-	-
CO5	3	2	3	-	2	-	-	-	2	-	2	-	3	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	10	10	-
Understand	10	-	10	-	20	20	-
Apply	40	100	30	100	50	50	100

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman

Analyse	-	-	10	-	20	20	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS L01 – Object Oriented Programming

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	2	0	2	60	3	50	50	100

Introduction to C++ and Functions* Evolution of C++ - Concepts of OOP - Advantages of OOP, Basics of C++ - Structure of a C++ Program - C++ Declarations - Functions - Return by Reference - Default Arguments - const arguments - Inline Functions - Function Overloading.	[6]
Classes and Objects, Constructors and Destructors* Classes in C++ - Declaring Objects - Access Specifiers and their Scope - Defining Member Functions - Static Members - Array of Objects - Object as Function Arguments - Friend Function and Friend Classes, Constructors and Destructors - Characteristics - Parameterized Constructor - Overloading Constructor - Copy Constructor - Dynamic Initialization Constructor - Destructors	[6]
Inheritance, Compile Time Polymorphism and Type Conversion* Inheritance - Reusability - Types of Inheritance - Abstract Classes - Object as Class Member, Operator Overloading - Rules for Operator Overloading - The Keyword Operator - Unary and Binary Operators Overloading - Overloading using Friend Function - Type Conversion.	[6]
Pointers, Binding and Polymorphism* Pointers - Pointer to Class - Pointer to Object - void, wild and this Pointers - Pointer to Constant and Constant Pointers - Dynamic Memory Allocation - Dynamic Objects, Polymorphism - Binding in C++ - Pointer to Base and Derived Class Objects - Working with Virtual Functions - Pure Virtual Functions - Virtual Destructor.	[6]
Generic Programming with Templates, Exception Handling* Class Templates - Function Templates - Exception Handling: Principles of Exception Handling - try, throw and catch keywords - Re-throwing Exception - Specifying Exception.	[6]
Practical: 1. Construct a C++ program to manage large amount of statements using functions 2. Design a C++ program to implement the concept of class and objects 3. Develop a C++ program to initialize the class members using constructors and destroy the objects by using destructor 4. Design a C++ program for reusability using inheritance 5. Develop a C++ program to perform compile time polymorphism 6. Develop a C++ program to handle function overriding by using virtual function. 7. Develop a C++ program to allow functions and classes to operate with generic types using templates	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**
Text Book(s):	
1. Ashok N. Kamthane, “Programming in C++”, Pearson, Second Edition, 2016.	

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman

2.	Herbert Schildt, " The Complete Reference C++", Fourth Edition, McGraw-Hill Education, 2013.
Reference(s):	
1.	Bjarne Stroustrup, "The C++ programming language", Addison Wesley, 2013.
2.	Venugopal K.R., Rajkumar Buyya, "Mastering C++", Second Edition, McGraw-Hill Education, 2013.
3.	Rajesh K. Shukla, "Object-Oriented Programming in C++", Wiley-India Edition, 2008
4.	E Balagurusamy, "Object Oriented Programming with C++", Sixth Edition, McGraw-Hill Education, 2013.

***SDG 4 – Quality Education**

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction to C++ and Functions**	
1.1	Evolution of C++ - Concepts of OOP	1
1.2	Advantages of OOP - Basics of C++	1
1.3	Structure of a C++ Program - C++ Declarations	1
1.4	Functions - Return by Reference	1
1.5	Default Arguments - const arguments	1
1.6	Inline Functions - Function Overloading	1
2	**Classes and Objects, Constructors and Destructors**	
2.1	Classes in C++ - Declaring Objects - Access Specifiers and their Scope	1
2.2	Defining Member Functions - Static Members	1
2.3	Array of Objects - Object as Function Arguments	1
2.4	Friend Function and Friend Classes	1
2.5	Constructors and Destructors - Characteristics - Parameterized Constructor	1
2.6	Constructors and Destructors	1
3	**Inheritance, Compile Time Polymorphism and Type Conversion**	
3.1	Inheritance - Reusability - Types of Inheritance	1
3.2	Abstract Classes - Object as Class Member	1
3.3	Operator Overloading - The Keyword Operator	1
3.4	Unary and Binary Operators Overloading	1
3.5	Overloading using Friend Function	1
3.6	Type Conversion	1
4	**Pointers, Memory Models, Binding and Polymorphism**	

4.1	Pointers - Pointer to Class - Pointer to Object	1
4.2	void, wild and this Pointers	1
4.3	Pointer to Constant and Constant Pointers	1
4.4	Dynamic Memory Allocation -Dynamic Objects	1
4.5	Polymorphism - Binding in C++ - Pointer to Base and Derived Class Objects	1
4.6	Virtual Functions - Virtual Destructor	1
5	**Generic Programming with Templates, Exception Handling**	
5.1	Class Templates	1
5.2	Function Templates	1
5.3	Exception Handling - Principles of Exception Handling	1
5.4	try, throw and catch keywords	1
5.5	Re-throwing Exception	1
5.6	Specifying Exception	1
Practical:		
1.	Construct a C++ program to manage large amount of statements using functions	5
2.	Design a C++ program to implement the concept of class and objects	5
3.	Develop a C++ program to initialize the class members using constructors and destroy the objects by using destructor	4
4.	Design a C++ program for reusability using inheritance	4
5.	Develop a C++ program to perform compile time polymorphism	4
6.	Develop a C++ program to handle function overriding by using virtual function	4
7.	Develop a C++ program to allow functions and classes to operate with generic types using templates	4

Course Designer(s)

1. Dr. R.GOPINATH – gopinath@ksrct.ac.in

60 CS L02	Angular JS	Category	L	T	P	Credit
		OE	2	0	2	3

Objectives

- To understand the design of single-page applications and how Angular JS facilitates their development
- To properly separate the model, view, and controller layers of your application and implement them using Angular JS
- To master Angular JS expressions, filters, and scopes
- To build Angular forms
- To implement Ajax in your Angular JS applications

Pre-requisites

Moderate knowledge of HTML, CSS, and JavaScript

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recall the concepts of HTML and JavaScript and express the features of AngularJS	Understand
CO2	Apply the concept of binding, template and various effects of elements and events	Apply
CO3	Apply the knowledge of scopes and controllers and various features of directives	Apply
CO4	Identify the several services and its works and Design the applications using AJAX	Apply
CO5	Comprehend the concepts of animation services and various actions of provision and injection services	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	2	2	3	-	-	2	3	2	-	3	2	-	-
CO2	-	3	2	2	3	-	-	2	3	2	-	3	2	-	-
CO3	-	3	2	2	3	-	-	2	3	2	-	3	2	-	-
CO4	-	2	2	2	3	-	-	2	3	2	-	3	2	-	-
CO5	2	2	2	2	3	-	-	2	3	2	-	3	2	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	20	-
Understand	20	-	20	-	-	40	-
Apply	30	100	30	100	100	40	100
Analyse	-	-	-	-	-	-	-

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman

Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 CS L02 – Angular JS							
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
	2	0	2	60	3	50	50	100

Introduction* Introduction to AngularJS: HTML and Bootstrap CSS Primer - JavaScript Primer - Single Page Application –MVC Architecture – First Application of AngularJS.	[6]
Working with AngularJS* Binding – Template Directives – Elements – Events.	[6]
Working with Forms* Forms – Controllers – Scopes – Filters - Custom & Complex Directives.	[6]
Working with Services* Modules – Services – Global objects – Errors and Expressions – AJAX and Promises.	[6]
Advanced Services* REST – Views – Animation – Touch – Provision – Injection Real-world applications: NLP and Computer Vision.	[6]
Practical: 1. Build an Angular Application and serve it on a server. 2. Create an Angular application. Build a component inside the application in order to implement a simple login form. 3. Create an Angular application. Create a component to implement two-way binding which is a combination of both property binding and event binding. 4. Create an Angular application. Create a component to define the switch structural directive. The user will enter their choice of course based on which the switch directive will choose an appropriate output. 5. Write a program to show the responses while the Form is in the Submitted State and provide an Edit Button. 6. Create an Angular application. Create a component to inject a service into it. The component will also display the data provided by the service. The service will provide an array of employee details. 7. Create AngularJS application that allows users to maintain a collection of items. The application should display the current total number of items, and this count should automatically update as items are added or removed. Users should be able to add items to the collection and remove them as needed. Note: The default values for items may be included in the program. 8. Mini Project	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**
Text Book(s):	

1.	Adam Freeman, “Pro AngularJS”, Apress Publications.
2.	Ken Williamson, “Learning AngularJS: A Guide to AngularJS Development”, O' Reilly, 2015

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman

Reference(s):	
1.	Brad Green, ShyamSeshadri, “AngularJS”, O’REILLY publications.
2.	AgusKurniawan**,** **“**AngularJS Programming”, Kindle Edition.
3.	ValeriKarpov, Diego Netto, “Professional AngularJS”, Kindle Edition.
4.	Doguhan Uluca,” Angular 6 for Enterprise-Ready Web Applications: Deliver production-ready and cloud-scale Angular web apps”,kindle Edition,2018

***SDG 4 – Quality Education**

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction**	
1.1	Introduction to AngularJS	1
1.2	HTML and Bootstrap	1
1.3	CSS Primer	1
1.4	JavaScript Primer	1
1.5	Single Page Application	1
1.6	MVC Architecture, First Application of AngularJS	1
2	**Working with AngularJS**	
2.1	Introduction - Working with AngularJS	1
2.2	Binding	1
2.3	Template Directives	1
2.4	Elements	1
2.5	Events	1
2.6	Introduction - Working with AngularJS	1
3	**Working with Forms**	
3.1	Forms	1
3.2	Controllers	1
3.3	Scopes	1
3.4	Filters	1
3.5	Custom & Complex Directives.	2
4	**Working with Services**	
4.1	Modules	1
4.2	Services	1
4.3	Global objects	1
4.4	Errors and Expressions	1

4.5	AJAX and Promises	2
5	**Advanced Services**	
5.1	REST	1
5.2	Views	1
5.3	Animation	1
5.4	Touch	1
5.5	Provision, Injection	1
5.6	Real-world applications: NLP and Computer Vision	1
Practical:		
1.	Build an Angular Application and serve it on a server.	3
2.	Create an Angular application. Build a component inside the application in order to implement a simple login form.	3
3.	Create an Angular application. Create a component to implement two-way binding which is a combination of both property binding and event binding.	3
4.	Create an Angular application. Create a component to define the switch structural directive. The user will enter their choice of course based on which the switch directive will choose an appropriate output.	3
5.	Write a program to show the responses while the Form is in the Submitted State and provide an Edit Button	3
6.	Create an Angular application. Create a component to inject a service into it. The component will also display the data provided by the service. The service will provide an array of employee details.	3
7.	Create AngularJS application that allows users to maintain a collection of items. The application should display the current total number of items, and this count should automatically update as items are added or removed. Users should be able to add items to the collection and remove them as needed. Note: The default values for items may be included in the program.	4
8.	Mini Project.	8

Course Designer(s)

1. Ms. M. Varshana Devi -varshanadevi@ksrct.ac.in

60 CS L03	C# and .NET Core	Category	L	T	P	Credit
		OE	2	0	2	3

Objectives

- To gain the fundamental skills in C# programming Language
- To gain knowledge in object-oriented concepts in C#
- To understand the concepts of the .NET Core and its platform
- To implement data manipulation using Razor pages
- To enhance the knowledge in Model-View-Controller architecture

Pre-requisites

Object Oriented Programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic concepts of C#	Understand
CO2	Apply the Object-Oriented concepts in C# for problem solving	Apply
CO3	Develop web pages using ASP.NET Core platform	Apply
CO4	Implement the data manipulation concept using Razor Pages	Apply
CO5	Integrate the concept of MVC in ASP.NET Core platform	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	2	-	-	-	-	1	-	3	2	-	-
CO2	3	3	-	-	2	-	-	-	-	2	-	1	3	-	-
CO3	3	3	-	3	2	-	-	-	-	3	-	3	3	-	-
CO4	3	2	2	-	2	-	-	-	-	3	-	3	3	-	-
CO5	3	3	-	3	2	-	-	-	-	3	-	3	3	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination	End Sem Examination	
	Test 1		Test 2		(Marks)	(Marks)	
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	10	-
Understand	15	-	15	-	-	30	-
Apply	35	100	35	100	100	60	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	60	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering							
60 CS L03 – C# and .NET Core							
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
	2	0	2	60	3	50	50	100

Introduction to C#: Introducing C# – Understanding .NET – Overview of C# – Literals – Variables – Data Types – Operators –Expressions – Branching – Looping – Methods – Arrays – Strings – Structures – Enumerations.	[6]
Object-Oriented Programming in C#: Classes–Objects –Inheritance– Methods –Polymorphism –Interfaces –Operator Overloading – Delegates –Events–Errors–Exceptions–Collections–Managing File system.	[6]
ASP.NET Core Web Application using Razor Pages*: Introduction to ASP.NET Core Web Application – Environment Setup – Project Layout – Static and Default Files - Enabling and Defining Razor Pages – Shared Layouts – Using code-behind files.	[6]
Data Manipulation using Razor Pages*: Introduction to ADO.NET-Database connectivity concept using ADO.NET – Connection Class with Authentication – Command Class – DataReader Class –DataAdapter Class – DataSet – OnGet –OnPost – OnPostDelete – OnPostEdit – OnPostView – REST API – Model and Controller for REST API.	[6]
Model-View-Controller (MVC) in ASP.NET Core*: Introduction to MVC – Setting up an ASP.NET Core MVC Website – MVC Routing – Controllers and Actions –Model – Views – Parameters Passing – View Helpers – Model Validation.	[6]
Practical: 1. Develop simple application using C#. 2. Implement inheritance and Operator overloading using C#. 3. Design an ASP.NET Webpage to work with Dropdown list and ListBox controls. 4. Write a C# programs to demonstrate the concepts of Label, Text Box and Button controls. 5. Create a ADO.NET application in C# to verify if the connection is established with OLEDB and MS-ACCESS. 6. Create a ADO.NET applications in C# to demonstrate the Data Reader, Data Set, Data Adapter and Data View Objects 7. Develop a Registration Form with all Validation Controls. 8. Create a Web Service for all Arithmetic operations.	[30]
Total Hours:	**60**
Text Book(s):	

1.	Mark J. Price, “C# 8.0 and .NET Core 3.0 – Modern Cross-Platform Development”,4th Edition, Packt Publishing Limited, 2019.
2.	Dino Esposito, “Programming ASP.NET Core”, 1st Edition, Pearson Education Inc., 2018
Reference(s):	
1.	https://docs.microsoft.com/en-us/aspnet/core/
2.	Christian Nagel, “Professional C# 7 and .NET Core 2.0”, 1st Edition, Wiley Publication, 2018
3.	Andrew Troelsen Phil Japikse,” Pro C# 8 with .NET Core 3: Foundational Principles and Practices in Programming”, Apress, 2020
4.	Jon Skeet,” C# in Depth”,Fourth Edition, 2019

*SDG 4 – Quality Education

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of Hours**
1	**Introduction to C#**	
1.1	Introducing C# – Understanding .NET	1
1.2	Overview of C# – Literals	1
1.3	Variables – Data Types	1
1.4	Operators –Expressions	1
1.5	Branching – Looping	1
1.6	Methods – Arrays, Strings, Structures – Enumerations	1
2	**Object-Oriented Programming in C#**	
2.1	Object-Oriented Programming in C# -Classes – Objects	1
2.2	Inheritance, Methods – Polymorphism	1
2.3	Interfaces -Operator Overloading	1
2.4	Delegates –Events, Errors – Exceptions	1
2.5	Collections	1
2.6	Managing File system.	1
3	**ASP.NET Core Web Application using Razor Pages**	
3.1	Introduction to ASP.NET Core Web Application	1
3.2	Environment Setup	1
3.3	Project Layout	1
3.4	Static and Default Files	1
3.5	Enabling and Defining Razor Pages	1
3.6	Shared Layouts, Shared Layouts Using Code-Managing File system.	1
4	**Data Manipulation using Razor Pages**	
4.1	Introduction to ADO.NET	1
4.2	Database connectivity concept using ADO.NET	1
4.3	Connection Class with Authentication	1
4.4	Command Class, DataReader Class	1
4.5	DataAdapter Class, DataSe, OnGet –OnPost	1
4.6	OnPostDelete, OnPostEdit – OnPostView, REST API –Model and Controller for REST API.	1
5	**Model-View-Controller (MVC) in ASP.NET Core:**	
5.1	Introduction to MVC	1

5.2	Setting up an ASP.NET Core MVC Website	1
5.3	MVC Routing	1
5.4	Controllers and Actions	1
5.5	Model – Views, Parameters Passing	1
5.6	View Helpers, Model Validation.	1
Practical:		
1.	Develop simple application using C#.	3
2.	Implement inheritance and Operator overloading using C#.	3
3.	Design an ASP.NET Webpage to work with Dropdown list and ListBox controls	4
4.	Write a C# programs to demonstrate the concepts of Label, Text Box and Button controls.	4
5.	Create a ADO.NET application in C# to verify if the connection is established with OLEDB and MS-ACCESS.	4
6.	Create a ADO.NET applications in C# to demonstrate the Data Reader, Data Set, Data Adapter and Data View Objects	4
7.	Develop a Registration Form with all Validation Controls.	4
8.	Create a Web Service for all Arithmetic operations.	4

Course Designer(s)

1.Dr. P.Kaladevi - kaladevi@ksrct.ac.in

60 CS L04	Data Mining	Category	L	T	P	Credit
		OE	2	0	2	3

Objectives

- To introduce basic concepts, tasks, methods, and techniques in data mining.
- To emphasis is on various data mining problems and their solutions.
- To understand the data mining process and issues, learn various data mining techniques
- To apply the techniques in solving data mining problems using data mining tools and systems
- To apply the clustering analysis and statistical approach

Pre-requisites

Basic understanding of Linear Algebra, Statistics and programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic concept and issues of data mining	Understand
CO2	Develop data warehouse and OLAP technology for data mining	Apply
CO3	Interpret the steps of data preprocessing and multidimensional association rules	Apply
CO4	Implement different classification techniques and association rule mining and its applications	Apply

CO5	Apply different clustering techniques and outlier analysis in real time applications	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	2	2	3	-
CO2	3	3	3	-	2	2	-	-	2	-	-	2	2	3	-
CO3	3	3	3	-	2	-	-	-	2	-	-	2	2	3	-
CO4	3	3	3	-	2	2	-	-	3	-	-	2	2	3	-
CO5	3	3	3	-	2	2	-	-	3	-	-	2	2	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	20	-
Understand	20	-	20	-	-	30	-
Apply	30	100	30	100	100	50	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 CS L04 – Data Mining							
Semester	Hours / Week			Total Hours	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
	2	0	2	60	3	50	50	100
Introduction to Data Mining* Motivation and importance - What is Data Mining - Relational Databases - Data Warehouses - Transactional Databases -Advanced Database Systems - Data Mining Functionalities - Major issues in Data Mining.							[6]
Data Warehouse and OLAP Technology for Data Mining* What is a Data Warehouse - Multi-Dimensional Data Model - Data Warehouse Architecture – Data Warehouse Implementation - Development of Data Cube Technology - Data Warehousing to Data Mining.							[6]

Data Preprocessing and Data Mining Techniques* Data Preprocessing - Data Integration and Transformation - Data Reduction - Data Mining Primitives: Mining Association rule in large Databases - Association Rule Mining - Mining Single-dimensional Boolean Association rules from Transactional Databases - Mining Multi-dimensional Association rules from relational databases & Data Warehouses.	[6]
Classification and Prediction** Concepts and Issues regarding Classification and Prediction - Classification by Decision Tree Induction – Bayesian Classification - Classification by SVM - Classification by Random Forest - Classification by K nearest.	[6]
Cluster Analysis** What is Cluster Analysis? - Types of Data in Cluster Analysis - A Categorization of Major clustering methods – partitioning methods - Hierarchial methods - Density-Based Methods: DBSCAN - Outlier analysis.	[6]
Practical: 1. Implementation of exploratory data analysis 2. Implementation of preprocessing phase 3. Implementation of feature selection techniques 4. Implementation of Association rule mining 5. Implementation of Decision Tree Induction classification algorithm 6. Implementation of Bayesian Classification algorithm 7. Implementation of classification by SVM 8. Implementation of K nearest neighbor algorithm 9. Implementation of k-means clustering algorithm 10. Mini Project	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**
Text Book(s):	
1.	Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, 4th Edition, Morgan Kaufman Publications, 2022.
2.	Pang-Ning Tan et.,” Introduction to Data Mining”, first edition,2006.
Reference(s):	
1.	Adriaan, “Introduction to Data Mining”, Addison Wesley Publication
2.	Pujari A K, “Data Mining Techniques”, University Press.
3.	Mohammed J. Zaki and Wagner Meira, Jr,” Data Mining and Machine Learning: Fundamental Concepts and Algorithms”, Cambridge University Press, March 2020.
4.	Gordon S. Linoff, Michael J. A. Berry,” Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management”, Wiley publisher, third edition,2008

***SDG:4 – Quality Education**

****SDG:9 - Industry Innovation and Infrastructure**

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction to Data Mining**	
1.1	Motivation and importance - What is Data Mining	1

1.2	Relational Databases	1
1.3	Data Warehouses	1
1.4	Transactional Databases	1
1.5	Advanced Database Systems	1
1.6	Data Mining Functionalities - Major issues in Data Mining	1
2	**Data Warehouse and OLAP Technology for Data Mining**	
2.1	What is a Data Warehouse	1
2.2	Multi-Dimensional Data Model	1
2.3	Data Warehouse Architecture	1
2.4	Data Warehouse Implementation	1
2.5	Development of Data Cube Technology	1
2.6	Data Warehousing to Data Mining	1
3	**Data Preprocessing and Data Mining Techniques**	
3.1	Data Preprocessing: Data Integration and Transformation	1
3.2	Data Reduction	1
3.3	Data Mining Primitives: Mining Association rule in large Databases	1
3.4	Association Rule Mining	1
3.5	Mining Single-dimensional Boolean Association rules from Transactional Databases	1
3.6	Mining Multi-dimensional Association rules from relational databases & Data Warehouses	1
4	**Classification and Prediction**	
4.1	Concepts and Issues regarding Classification and Prediction	1
4.2	Classification by Decision Tree Induction	1
4.3	Bayesian Classification	1
4.4	Classification by SVM	1
4.5	Classification by Random Forest	1
4.6	Classification by K nearest neighbor	1
5	**Cluster Analysis**	
5.1	What is Cluster Analysis? Types of Data in Cluster Analysis	1
5.2	A Categorization of Major clustering methods	1
5.3	Partitioning methods	1
5.4	Hierarchial methods	1
5.5	Density-Based Methods: DBSCAN	1
5.6	Outlier analysis	1

Practical:		
1.	Implementation of exploratory data analysis	3
2.	Implementation of preprocessing phase	3
3.	Implementation of feature selection techniques	3
4.	Implementation of Association rule mining	3
5.	Implementation of Decision Tree Induction classification algorithm	3
6.	Implementation of Bayesian Classification algorithm	3
7.	Implementation of classification by SVM	3
8.	Implementation of K nearest neighbor algorithm	3
9.	Implementation of k-means clustering algorithm	3
10.	Mini Project	3

Course Designer(s)

1. Ms. T. Subalaxmi -subalakxmi@ksrct.ac.in

60 CS L05	Artificial Intelligence	Category	L	T	P	Credit
		OE	2	0	2	3

Objectives

- Understand the fundamentals of problem solving
- Interpret the knowledge and reasoning in propositional logic and first order logic
- Gain knowledge on Planning and acting in the real world
- Learn to represent uncertain knowledge in solving AI problems and ML and deep learning algorithms and models
- Understand the different forms of learning and NLP, computer vision

Pre-requisites

Knowledge on statistics, linear algebra, matrix, calculus, probability, programming languages and data modelling

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the concepts of intelligent agents and problem solving aspects.	Understand
CO2	Apply the knowledge of propositional logic and FOL.	Apply
CO3	Understand the issues of planning problems.	Understand
CO4	Describe the Uncertainty, probabilistic reasoning, ML and deep learning algorithms and models.	Understand
CO5	Apply the learning methods for AI applications.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	2	-	-	-	-	-	-	2	-	3	-
CO3	3	2	2	2	2	2	-	-	-	-	-	2	-	3	-
CO4	3	2	2	2	2	2	-	-	-	-	-	2	-	3	-
CO5	3	3	2	2	2	-	-	-	-	-	-	2	-	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	10	-
Understand	30	-	30	-	-	60	-
Apply	20	100	20	100	100	30	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-

Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 CS L05 – Artificial Intelligence							
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
	2	0	2	60	3	50	50	100

Problem Solving* Introduction - What is Artificial Intelligence? – Structure of Intelligent Agents –Problem formulation – Uninformed search strategies – Informed search strategies – Constraint satisfaction problems.	**[6]**
Knowledge and Reasoning* Logical agents – Propositional logic – First-order logic – Inference in first order logic – Unification - Forward Chaining – Backward Chaining – Resolution.	**[6]**
Planning* Planning Problem - Planning with state-space search – Partial-order planning – Planning graphs - Planning and acting in the real world - Conditional planning - Multi agent planning.	**[6]**
Uncertain Knowledge and Reasoning Uncertainty – Notations and Axioms of Probability – Probabilistic Reasoning – Bayesian networks (Semantics, Exact Inference, Approximate Inference) – Inference in Temporal models – Hidden Markov models-**Introduction to ML-Machine learning fundamentalsDeep learning***	**[6]**
Learning and Applications** Learning from observation –Inductive learning –Decision trees – Ensemble Learning – Explanation based learning – Statistical Learning methods. Applications of Artificial intelligence- **NLP and Computer Vision***	**[6]**
Practical Exercises: ** 1. Develop PEAS descriptions for given AI tasks 2. Implement Hill climbing algorithm 3. Write a program to generate the output for A* algorithm 4. Write a program to show the Tic Tac Toe game for 0 and X 5. Implementation of Bayesian Belief networks 6. Approximate inferences in Bayesian network 7. Implementation of decision problems for various real-world applications 8. To learn various Bayesian parameters 9. Implementation of Hidden Markov Models 10. Implement propositional logic inferences for AI tasks.	**[30]**
Total Hours: (Lecture - 30; Practical - 30)	**60**
Text Book(s):	
1. Russel S and Norvig P, “Artificial Intelligence – A Modern Approach”, Fourth Edition, Pearson Education, 2022.	
2. Melanie Mitchell,” Artificial Intelligence: A Guide for Thinking Humans”, Farrar, Straus and Giroux Publisher,2019	
Reference(s):	

Rev. No.4/w.e.f. 01.06.2024

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman

1.	Dan W. Patterson, “Introduction to AI and ES”, Third Edition, Pearson Education, 2007.
2.	Nils J. Nilsson, “The Quest for Artificial Intelligence”, Cambridge University Press, 2009.
3.	Nptel course, Artificial Intelligence, https://nptel.ac.in/courses/106106126/
4.	Stuart Russell,” Human Compatible – Artificial Intelligence and the Problem of Control”,Viking publisher,2019
5.	Carl Dennis,”Machine Learning And Artificial Intelligence: A Comprehensive Guide to Understanding and Implementing ML and AI (2023 Beginner Crash Course)”,Carl Dennis,2023

***SDG:4 – Quality Education**
****SDG:9 - Industry Innovation and Infrastructure**

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Problem Solving**	
1.1	Introduction – What is Artificial Intelligence?	1
1.2	Structure of Intelligent Agents	1
1.3	Problem formulation	1
1.4	Uninformed search strategies	1
1.5	Informed search strategies	1
1.6	Constraint satisfaction problems	1
2	**Knowledge and Reasoning**	
2.1	Logical agents	1
2.2	Propositional logic	1
2.3	First-order logic	1
2.4	Inference in first order logic, Unification	1
2.5	Forward Chaining,Backward Chaining	1
2.6	Resolution	1
3	**Planning**	
3.1	Planning Problem	1
3.2	Planning with state-space search, Partial-order planning	1
3.3	Planning graphs, Planning and acting in the real world	1
3.4	Conditional planning	1
3.5	Multi agent planning	1
3.6	Robotics-Action	1
4	**Uncertain Knowledge and Reasoning**	
4.1	Uncertainty	1
4.2	Notations and Axioms of Probability	1
4.3	Probabilistic Reasoning	1
4.4	Bayesian networks (Semantics, Exact Inference, Approximate Inference)	1
4.5	Inference in Temporal models	1
4.6	Introduction to AI and ML-Machine learning fundamentals, Deep learning	1

5	**Learning and Applications**	
5.1	Learning from observation	1
5.2	Inductive learning	1
5.3	Decision trees	1
5.4	Ensemble Learning	1
5.5	Explanation based learning,Statistical Learning methods	1
5.6	Applications of Artificial intelligence, NLP and Computer vision	1
Practical:		
1.	Develop PEAS descriptions for given AI tasks	3
2.	Implement Hill climbing algorithm	3
3.	Write a program to generate the output for A* algorithm	3
4.	Write a program to show the Tic Tac Toe game for 0 and X	3
5.	Implementation of Bayesian Belief networks	3
6.	Approximate inferences in Bayesian network	3
7.	Implementation of decision problems for various real-world applications	3
8.	Learn various Bayesian parameters	3
9.	Implementation of Hidden Markov Models	3
10.	Implement propositional logic inferences for AI tasks	3

Course Designer(s)

1.Mr.R.Vijay Sai -vijaysair@ksrct.ac.in

60 CS L06	Python Programming for Data Analytics	Category	L	T	P	Credit
		OE	2	0	2	3

Objectives

- To know the basic python concepts
- To understand the data wrangling and string manipulation
- To understand data aggregation, group operation and time series
- To learn web scrapping and CSS selectors
- To visualize the data using packages in python

Pre-requisites

Knowledge in basic mathematics, including algebra, calculus, and probability

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understanding the basic concepts of Python and data structures	Understand
CO2	Apply the concept of data wrangling and various ways of combining and merging datasets	Apply
CO3	Implement data aggregation and group operations and time series basics	Apply
CO4	Gain the knowledge for Preparing and pre-processing of data, data aggregation and grouping concepts	Apply
CO5	Apply web scraping and visualize the results of analytics effectively	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	-	-		-	-	-	-	-	-	2	3	-	-
CO2	2	3	3	-	3	-	-	-	-	-	-	3	3	-	-
CO3	3	3	2	-	3	-	-	-	2	2	2	3	3	-	-
CO4	3	3	2	-	3	-	-	2	2	2	2	3	3	-	-
CO5	3	3	3	-	3	-	-	2	2	2	2	3	3	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab

Remember	10	-	10	-	-	10	-
Understand	20	-	20	-	-	40	-
Apply	30	100	30	100	100	50	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS L06- Python Programming for Data Analytics								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
	2	0	2	60	3	50	50	100
Python Concepts* Interpreter – Program Execution – Statements – Expressions – Flow Controls – Functions - Numeric Types –Sequences - Strings, Tuples, Lists and - Class Definition – Constructors – Inheritance – Overloading – Text & Binary Files - Reading and Writing.								[6]
Data Wrangling* Combining and Merging DataSets – Reshaping and Pivoting – Data Transformation – String Manipulation, Regular Expressions.								[6]
Data Aggregation, Group Operations, Timeseries* GoupBy Mechanics – Data Aggregation – Groupwise Operations and Transformations – Pivot Tables and Cross Tabulations – Date and Time Date Type tools – Time Series Basics – Data Ranges, Frequencies and Shifting.								[6]
Web Scraping* Data Acquisition by Scraping web applications –Submitting a form - Fetching web pages – Downloading web pages through form submission – CSS Selectors.								[6]
Visualization in Python* Matplotlib package – Plotting Graphs – Controlling Graph – Adding Text – More Graph Types – Getting and setting values – Patches.								[6]
Practical: 1. Basic Python Programs 2. Program using String Operations 3. Program on python Data structures 4. Working with data in python using pandas 5. Design a personal web page using CSS 6. Visualization in python using matplotlib								[30]
Total Hours: (Lecture - 30; Practical - 30)								**60**
Text Book(s):								
1.	Mark Lutz, “Programming Python”, O'Reilly Media, 4th edition, 2010.							
2.	Mark Lutz, “Learning Python”, O'Reilly Media, 5th Edition, 2013.							
Reference(s):								
1.	Tim Hall and Stacey J P, “Python 3 for Absolute Beginners”, Apress, 1st edition, 2009.							
2.	Magnus Lie Hetland, “Beginning Python: From Novice to Professional”, Apress, Second Edition, 2005.							

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Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman

3.	Shai Vaingast, “Beginning Python Visualization Crafting Visual Transformation Scripts”, Apress, 2nd edition, 2014.
4.	Wes Mc Kinney, “Python for Data Analysis”, O'Reilly Media, 2012.
5.	Carl Dennis,”Machine Learning And Artificial Intelligence: A Comprehensive Guide to Understanding and Implementing ML and AI (2023 Beginner Crash Course)”,Carl Dennis,2023.

* SDG 4- Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Python Concepts**	
1.1	Interpreter – Program Execution - Statements, Expressions	1
1.2	Flow Controls, Functions	1
1.3	Numeric Types, Sequences Strings	1
1.4	Tuples, Lists Class Definition – Constructors	1
1.5	Inheritance – Overloading	1
1.6	Text & Binary Files - Reading and Writing.	1
2	**Data Wrangling**	
2.1	Combining and Merging DataSets	2
2.2	Reshaping and Pivoting	1
2.3	Data Transformation	1
2.4	String Manipulation	1
2.5	Regular Expressions	1
3	**Data Aggregation, Group Operations, Timeseries**	
3.1	GoupBy Mechanics	1
3.2	Data Aggregation	1
3.3	Groupwise Operations and Transformations	1
3.4	Pivot Tables and Cross Tabulations	1
3.5	Date and Time Date Type tools	1
3.6	Time Series Basics -Data Ranges- Frequencies and Shifting	1
4	**Web Scraping**	
4.1	Data Acquisition by Scraping web applications	1
4.2	Submitting a form	1
4.3	Fetching web pages	1
4.4	Downloading web pages through form submission	2
4.5	CSS Selectors	1

5	**Visualization in Python***	
5.1	Matplotlib package	1
5.2	Plotting Graphs	1
5.3	Controlling Graph	1
5.4	Adding Text	1
5.5	More Graph Types	1
5.6	Patches	1
Practical:		
1.	Basic Python Programs	5
2.	Program using String Operations	5

3.	Program on python Data structures	5
4.	Working with data in python using pandas	5
5.	Design a personal web page using CSS	5
6.	Visualization in python using matplotlib	5

Course Designer(s)

1. Ms. M. Saradha – saradha@ksrct.ac.in

61 CS L07	Java Programming	Category	L	T	P	Credit
		OE	2	0	2	3

Objectives

- To cram the fundamental element of the Java language
- To communicate classes over objects using methods
- To implement Packages and Interfaces
- To understand the concept of Collections
- To handle the run time errors using exception handling

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Know the need of Platform independency by acquiring knowledge in architecture, Language basics and implementing Character and String Class	Understand
CO2	Express the concept of classes, objects and communicate classes over objects using methods	Apply
CO3	Implement applications using Packages and Interfaces	Apply
CO4	Apply the collection classes to implement various data structures	Apply
CO5	Apply the concept of exception handling to handle abnormal conditions	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	2	3	3	-	2	2	-	-	2	-	-	2	3	-	-
CO3	2	3	3	-	2	-	-	-	2	-	-	3	3	-	-
CO4	3	3	2	-	2	2	-	-	3	-	-	-	3	-	-

CO5	3	3	3	-	2	2	-	-	3	-	-	-	3	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination	End Sem Examination	
	Test 1		Test 2		(Marks)	(Marks)	
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	-	-	-	-	-	-	-
Understand	10	-	10	-	-	20	-
Apply	50	100	50	100	100	80	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	60	60	100	60	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
61 CS L07- Java Programming								
Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	2	0	2	60	3	50	50	100

JAVA FUNDAMENTALS* Fundamentals of OOPs – Java Features – Java Architecture-Language Basics: set PATH, set CLASSPATH, Executing your first Java Program-Constants – Variables – Data types - Operators – Arrays –control statements – Character Class- Strings : String class, String Buffer class, String Builder Class and String handling methods.	[6]
CLASS and OBJECTS* Class – Object– Methods-Method overloading-Constructor-Constructor OverloadingWrapper Class - Inheritance-Method Overriding-super-final-Garbage Collection.	[6]
PACKAGES, INTERFACES* Packages - Access specifiers - Built-in Packages, User defined Packages – Interfaces Abstract Class.	[6]
COLLECTIONS* Collections: Iterator, Enumerator, List, Set, Queue Vector.	[6]

EXCEPTION HANDLING* Exception Handling – try – catch – throw – throws – finally - finalize - Managing Predefined Exceptions - Creating and handling User defined Exceptions.	[6]
Practical: 1. Implementation of Simple Java Programs* 2. Implementation of Array based Logical Programs* 3. Implementation of Character, String class* 4. Demonstration of communication of classes over objects using getter, setter, constructor, methods * 5. Implementation of various inheritance* 6. Implementation of various data structures using Collections* 7. Implementation of different applications using packages, interfaces 8. Check abnormal conditions using exception handling* **9.** Mini – Project*	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Herbert Schildt, "The Java 2: Complete Reference", Fifth edition, TMH,2002.
2.	Heckler M, “JavaFX 8: Introduction by Example”, Second Edition, Apress.
Reference(s):	
1.	https://www.tutorialspoint.com
2.	https://www.javatpoint.com
3.	https://beginnersbook.com
4.	https://www.journaldev.com
5.	https://www.tutorialspoint.com

* SDG 4- Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Java Fundamentals***	
1.1	Fundamentals of OOPs	1

1.2	Java Features – Java Architecture	1
1.3	Language Basics: set PATH, set CLASSPATH, Executing your first Java Program	1
1.4	Constants – Variables	1
1.5	Data types -Operators – Arrays	1
1.6	control statements- Character Class- Strings	1
2	**Class and Objects**	
2.1	Class – Object	2
2.2	Methods-Method overloading	1
2.3	Constructor	1
2.4	Constructor Overloading- Wrapper Class	1
2.5	Inheritance- Method Overriding	1
3	**Packages and Interfaces**	
3.1	Packages	1
3.2	Access specifiers	1
3.3	Built-in Packages	1
3.4	User defined Packages	1
3.5	Interfaces	1
3.6	Abstract Class	1
4	**Collections**	
4.1	Collections: Iterator	1
4.2	Enumerator	1
4.3	List	1
4.4	Set	2
4.5	Queue Vector	1
5	**Exception Handling**	
5.1	Exception Handling	2
5.2	try-catch-throw	1
5.3	throws-finally-finalize	1
5.4	Managing Predefined Exceptions	1
5.5	Creating and handling User defined Exceptions	1
Practical:		
1.	Implementation of Simple Java Programs	3
2.	Implementation of Array based Logical Programs	3
3.	Implementation of Character, String class	3
4.	Demonstration of communication of classes over objects using getter, setter, constructor, methods	3
5.	Implementation of various inheritance	3
6.	Implementation of various data structures using Collections	3
7.	Implementation of different applications using packages, interfaces	3
8.	Check abnormal conditions using exception handling	3
9.	Mini Project	6

Course Designer(s)

1. Ms. J.Mythili - mythili@ksrct.ac.in

60 CS L08	Linux and Shell Programming	Category	L	T	P	Credit
		OE	2	0	2	3

Objectives

- To know the basics of Linux OS, Linux environment and file system
- To understand and make effective use of the UNIX commands
- To learn and understand the use of process fundamentals in Linux
- To enhance the skills needed for the shell scripting and shell programming
- To develop the writing skills for system programming

Pre-requisites

Knowledge on basic programming constructs

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apprehend the basics of Linux environment and file system	Apply
CO2	Demonstrate and execute the files and directories commands to store in directories	Apply
CO3	Interpret the uses of commands for the processes in Linux	Apply
CO4	Analyze and implement the programs using shell programming	Analyze
CO5	Design and execute the filter commands using regular expressions to match a string of text	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-
CO2	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-
CO3	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-
CO4	3	-	3	-	-	-	-	-	2	-	-	2	3	3	-
CO5	3	-	3	-	-	-	-	-	2	-	-	2	3	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab

Remember	10	-	10	-	-	10	-
Understand	20	-	20	-	-	20	-
Apply	30	100	20	100	100	40	100
Analyse	-	-	10	-	-	30	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS L08 – Linux and Shell Programming								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
	2	0	2	60	3	50	50	100

Introduction* Linux Introduction and File System - Basic Features, Advantages, Installing Requirement, Basic Architecture of Unix/Linux System, Kernel, Shell, Linux File System - Boot Block, Super Block, Inode Table, Data Blocks, How Linux Access Files, Storage Files, Linux Standard Directories.	[6]
Files and Directories Commands* Files and Directories Commands - cd, ls, cp, md, rm, mkdir, rmdir, pwd, file, more and less, Creating and Viewing Files Command - cat, File Comparisons Commands - cmp and comm, View files, Disk Related Commands, Checking Disk Free Spaces, System Startup and Shut - Down Process, init and Run Levels.	[6]

Essential Linux Commands* Understanding Shells, Processes in Linux - Process Fundamentals, Connecting Processes Commands - pipes and tee, Input/Output Redirecting, Manual Help, Background Processing, Managing Multiple Processes, Changing Process Priority with nice Command, Scheduling of Processes Commands - at, cron, batch, kill, ps, who and sleep, Printing Commands - find, sort, touch and file, File Related Commands - ws, sat, cut and dd, Mathematical Commands - bc, expr, factor and units, Creating and Editing Files Commands - vi and vim.	[6]
Shell Programming* Shell Programming - Basic of Shell Programming, Various Types of Shell Available in Linux, Comparisons Between Various Shells, Shell Programming in Bash - read Command, Conditional and Looping Statements, Case Statements, Parameter Passing and Arguments, Shell Variables, System Shell Variables, Shell Keywords, Creating Shell Programs.	[6]
Filtering Commands* Filtering Commands - pr, head, tail, cut, paste, sort, uniq and tr, Filter using Regular Expressions - grep, egrep, and sed; AWK Programming – Report Printing with AWK.	[6]
Practical: 1. Execution of files and directory commands to list all files or directories in the current directory. 2. Execution of scheduling of processes commands to schedule one-time jobs for a specific time and date 3. Implementation of Shell script to perform operations on files and strings. 4. Implementation of Shell programming concepts such as conditional and looping statements, and functions. 5. Implement and execute the C program in Linux. 6. Implementation of inter process communication between two unrelated processes. 7. Execution of filtering commands for filtering text for effective file operations. 8. Execution of filters and regular expressions commands grep, awk and sed that use all of its features.	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Behrouz A. Forouzan and Richard F. Gilberg, ” Unix and Shell Programming”, Cengage Learning, 2009.
2.	Richard Blum, ” Linux Command Line and Shell Scripting Bible”, Second Edition, Wiley India Pvt. Ltd., 2011.
Reference(s):	
1.	Richard Petersen, “Linux: The Complete Reference”, Sixth Edition, McGraw-Hill Companies, 2008.
2.	Neil Matthew and Richard Stones, ”Beginning Linux Programming”, Wiley Publishing, 2008.
3.	Eric Foster-Johnson, John C. Welch and Micah Anderson, “Beginning Shell Scripting”, Wiley Publishing, 2008.
4.	Christopher Vickery, “UNIX Shell Programmer's Interactive Workbook”, Pearson Education 2001.

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours

1	**Introduction**	
1.1	Linux Introduction and File System	1
1.2	Basic Features, Advantages	1
1.3	Installing Requirement, Basic Architecture of Unix/Linux System, Kernel, Shell, Linux File System	1
1.4	Boot Block, Super Block, Inode Table	1
1.5	Data Blocks, How Linux Access Files	1
1.6	Storage Files, Linux Standard Directories	1
2	**Files and Directories Commands**	
2.1	Files and Directories Commands - cd, ls, cp, md, rm, mkdir, rmdir, pwd, file, more and less	1
2.2	Creating and Viewing Files Command - cat,	1
2.3	File Comparisons Commands - cmp and comm	1
2.4	View files, Disk Related Commands	1
2.5	Checking Disk Free Spaces	1
2.6	System Startup and Shut - Down Process, init and Run Levels	1
3	**Essential Linux Commands**	
3.1	Understanding Shells	1
3.2	Processes in Linux - Process Fundamentals, Connecting Processes Commands	1
3.3	pipes and tee, Input/Output Redirecting, Manual Help	1
3.4	Background Processing, Managing Multiple Processes, Changing Process Priority with nice Command	1
3.5	Scheduling of Processes Commands - at, cron, batch, kill, ps, who and sleep, Printing Commands - find, sort, touch and file	1
3.6	File Related Commands - ws, sat, cut and dd, Mathematical Commands - bc, expr, factor and units, Creating and Editing Files Commands - vi and vim.	1
4	**Shell Programming**	
4.1	Shell Programming - Basic of Shell Programming	1
4.2	Various Types of Shell Available in Linux	1
4.3	Comparisons Between Various Shells	1
4.4	Shell Programming in Bash - read Command, Conditional and Looping Statements	1
4.5	Case Statements, Parameter Passing and Arguments	1
4.6	Shell Variables, System Shell Variables, Shell Keywords, Creating Shell Programs.	1
5	**Filtering Commands**	
5.1	Filtering Commands - pr, head, tail, cut, paste, sort, uniq and tr,	1
5.2	Filter using Regular Expressions - grep, egrep, and sed	1
5.3	AWK Programming	2
5.4	Report Printing with AWK	2
Practical:		

1.	Execution of files and directory commands to list all files or directories in the current directory.	4
2.	Execution of scheduling of processes commands to schedule one-time jobs for a specific time and date	4
3.	Implementation of Shell script to perform operations on files and strings.	4
4.	Implementation of Shell programming concepts such as conditional and looping statements, and functions.	4
5.	Implement and execute the C program in Linux.	4
6.	Implementation of inter process communication between two unrelated processes.	5
7.	Execution of filtering commands for filtering text for effective file operations.	5

Course Designer(s)

1. Dr. R. Gopinath -gopinathr@ksrct.ac.in

60 CS L09	Salesforce	Category	L	T	P	Credit
		OE	2	0	2	3

Objectives

- To Understand Salesforce Architecture and Features
- To know the customization process in Salesforce
- To Understand the security model
- To Understand the Sales Cloud and Cloud modules
- To Understand the business process automation options, reports and dashboard

Pre-requisites

Knowledge on Software Engineering and computer programming skills

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply data modeling techniques to design and configure custom objects, fields, and relationships in Salesforce.	Apply
CO2	Apply advanced data management and customization techniques in Salesforce to enhance data organization and user experience	Apply
CO3	Evaluate and recommend appropriate Salesforce user setup and security settings to control access and permissions	Analyze
CO4	Develop advanced automation solutions using Process Builder and Visual Workflow to meet complex business requirements	Apply
CO5	Evaluate and recommend appropriate reporting and analytics strategies based on business requirements.	Evaluate

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-
CO2	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-
CO3	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-
CO4	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-

CO5	3	-	3	-	-	-	-	-	2	-	-	2	3	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	10	-
Understand	15	-	15	-	-	20	-
Apply	35	100	15	50	50	40	50
Analyse	-	-	20	50	50	30	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	100	100	100	100	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 CS L09 – Salesforce							
Semester	Hours / Week			Total Hours	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
	2	0	2	60	3	50	50	100
Salesforce Fundamentals Introduction to CRM- Overview of Salesforce platform and its Architecture, Salesforce editions and licenses - Salesforce user interface and Salesforce Lightning Experience Signing up Developer Edition , Apps Creation.- Standard Objects - Creating Custom Objects - Fields and data types							[6]
Salesforce Data Management and Customization Essentials* Creating Formula Fields, Data Validation - Validation rules. Working with Record Types and Page Layouts - Compact Layout- Lightning Record Pages - Path Settings. - List Views - Relationships and junction objects, Roll up Summary.							[6]
Security and Data Access* Organization Security Controls - User Setup and Security - User Creation- Security Model: Profile settings and permissions - Permission set- Salesforce Sharing model Organization Wide Defaults (OWD) - Role Hierarchy- Sharing Rules- Manual Sharing - Sharing rules and public groups.							[6]

Business Process Automation Introduction to Flows: Types of Flow: Screen Flow- Record Trigrrered Flow- Scheduled Trigger Flow- Auto Launched Flow. **uses cases of Process Automation. Email Alerts and Field Updates - Approval Processes**.**	[6]
Reports, Dashboards, and Analytics Creating or customizing a report - Summarizing data, report formats and filtering data, **Report Charts and Dashboard Components, Custom Report Types- Dashboard Creation and Modification **.**	[6]

Practical: [30]

1. Create Objects, Fields and App
2. Explore Data Types
3. Create Field Relationships
4. Create Record Types(create), Page Layout (adding section, field property settings), Page Layout Assignment (assign page layout based on Record types)
5. Create Lightning Record Page, List View, Path Settings
6. Validation Rule
7. **Automation I***
    a. Screen Flow
    b. Auto Launched Flow
8. **Automation II***
    a. Record Trigger Flow
    b. Scheduled Flow
    c. Approval Process
9. **Security***
    a. Profiles and Permission Set
    b. Org Wide Default
    c. Roles
    d. Sharing Rules
    e. Manual Sharing
10. **Reports and Dashboards ****
    a. Custom Report Types
    b. Dynamic Dashboards
    c. Report and Dashboards Sharing

Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):

1.	Sharif Shaalan, Timothy Royer, “Salesforce for Beginners, A step-by-step guide to optimize sales and marketing and automate business processes with the Salesforce platform”, 2nd Edition, Packt Publishing Limited, 2022.
	Sharif Shaalan, “Salesforce for Beginners: A step-by-step guide to creating, managing, and automating sales and marketing processes Paperback – Illustrated”, Packt Publishing Limited, 2020

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Salesforce Fundamentals**	
1.1	Introduction to CRM	1
1.2	Overview of Salesforce platform and its Architecture, editions and licenses	1

1.3	Salesforce Lightning Experience, user interface and navigation	1
1.4	Signing up Developer Edition - Apps Creation	1
1.5	Standard Objects	1
1.6	Creating Custom Objects - Fields and data types	1
2.0	**Salesforce Data Management and Customization Essentials**	
2.1	Creating Formula Fields	1
2.2	Data Validation - Validation rules	1
2.3	Working with Record Types and Page Layouts	1
2.4	Compact Layout- Lightning Record Pages	1
2.5	Path Settings, List Views	1
2.6	Relationships and junction objects, Roll up Summary	1
3.0	**Security and Data Access**	
3.1	Organization Security Controls	1
3.2	User Setup and Security - User Creation	1
3.3	Security Model: Profile settings and permissions, Permission set	1
3.4	Salesforce Sharing model -Organization Wide Defaults (OWD)	1
3.5	Role Hierarchy- Sharing Rules- Manual Sharing	1
3.6	Sharing rules and public groups	1
4.0	**Business Process Automation**	
4.1	Introduction to Flows: Types of Flow	1
4.2	Uses cases of Process Automation -Screen Flow	1
4.3	Record Trigrrered Flow	1
4.4	Scheduled Trigger Flow	1
4.5	Auto Launched Flow	1
4.6	Email Alerts and Field Updates - Approval Processes	1
5.0	**Reports, Dashboards, and Analytics**	
5.1	Creating or customizing a report	1
5.2	Summarizing data, report formats and filtering data	1
5.3	Report Charts and Dashboard Components	1
5.4	custom report types- Summary Report	1
5.5	Tabular Report- matrix Report	
5.6	Dash Boards: Standard DashBoards & Dynamic DashBoards	1
Practical:		
1.	Create Objects, Fields and App	3
2.	Explore Data Types	3
3	Create Field Relationships	3
4	Create Record Types(create), Page Layout (adding section, field property settings), Page Layout Assignment (assign page layout based on Record types)	3
5	Create Lightning Record Page, List View, Path Settings	3

6	Validation Rule	3
7	Automation I* a. Screen Flow b. Auto Launched Flow	3
8	Automation II* a. Record Trigger Flow b. Scheduled Flow Approval Process	3
9	Security* a. Profiles and Permission Set b. Org Wide Default c. Roles d. Sharing Rules e. Manual Sharing	3
10	Reports and Dashboards ** a. Custom Report Types b. Dynamic Dashboards Report and Dashboards Sharing	3

Course Designer(s)

1. Dr. P. Kaladevi -kaladevi@ksrct.ac.in

60 CS L10	Scripting Languages	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To learn various scripting languages
- To understand the basic of JQuery
- To learn Ruby and working with web
- To learn the basics of TCL
- To learn the advanced concepts of TCL

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the concept Scripting and JavaScript	Understand
CO2	Explore the concept of JQuery	Apply
CO3	Understand the use of Ruby	Understand
CO4	Analyze the structure of TCL	Analyze
CO5	Explore the commands and issues in TCL	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	3	-	-	-	-	2	2	3	2	-	-
CO2	2	2	2	2	3	-	-	-	-	2	2	3	2	2	-
CO3	2	2	2	2	3	2	-	-	-	2	2	3	2	2	-
CO4	2	2	2	2	3	2	-	-	-	2	2	3	2	2	-
CO5	-	-	-	-	3	-	-	-	-	2	2	3	2	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	15	15	20
Apply	35	15	40
Analyse	-	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022							
B.E – Computer Science and Engineering							
60 CS L10 – Scripting Languages							
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100

Introduction to Scripting and JavaScript* Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting languages, Web Scripting, and the universe of Scripting Languages, what is JavaScript – Object models – Design philosophy –Versions of JavaScript – The JavaScript core language – System objects – Advanced facilities – JavaScript and Java – JavaScript operators and precedence.	[9]
jQuery ** Introduction to jQuery -Using jQuery Core -jQuery Events – jQuery Effects - AJAX and jQuery -HTML5 Forms and jQuery UI.	[9]
Ruby ** Introduction Ruby, Rails, the structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services, RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling.	[9]
Introduction to TCL * TCL structure, syntax, variables and data in TCL, control flow, data structures, input/output, procedures, strings, patterns, files.	[9]
Advanced TCL Eval, source, exec and up level commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts internet programming, Security issues, C interface, Java interface.	[9]
Total Hours:	**45**

Text Book(s):	
1.	David Barron: “The World of Scripting Languages”, 1st Edition, Wiley publications.
2.	David Flanagan, Yukihiro Matsumoto: “The Ruby Programming Language”, O’Reilly Media,.
Reference(s):	
1.	John Ousterhout, Ken Jones: “Tcl and the Tk Toolkit”, 2nd Edition, Pearson education.
2.	Dabve Thomas, “Programming Ruby: The Pragmatic Programmers' Guide” Second edition
3.	https://api.jquery.com/
4.	Alex Libby, “Mastering jQuery”, Packet Publications first edition,2015

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of Hours**
1	**Introduction to Scripting and JavaScript**	
1.1	Scripts and Programs	1
1.2	Origin of Scripting, Scripting Today, Characteristics of Scripting languages	1
1.3	Web Scripting, and the universe of Scripting Languages	1
1.4	what is JavaScript – Object models	2
1.5	Design philosophy –Versions of JavaScript, The JavaScript core language – System objects	2
1.6	Advanced facilities - JavaScript and Java, JavaScript operators and precedence.	2
2	**JQuery**	
2.1	Introduction to jQuery	2
2.2	Using jQuery Core	2
2.3	jQuery Events	2
2.4	jQuery Effects	1
2.5	AJAX and jQuery	1
2.6	HTML5, Forms and jQuery UI.	1
3	**Ruby**	
3.1	Introduction Ruby, Rails, the structure and Execution of Ruby Programs	2
3.2	Package Management with RUBYGEMS	2
3.3	Ruby and web: Writing CGI scripts, cookies	2
3.4	Choice of Webservers	1
3.5	SOAP and web services	1
3.6	RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling.	1
4	**Introduction to TCL**	
4.1	TCL structure, syntax	2
4.2	Variables and data in TCL	1
4.3	Control flow	2
4.4	Data structures	1
4.5	Input/output, Procedures	1
4.6	Strings, patterns, Files	2
5	**Advanced TCL**	
5.1	Eval	2
5.2	source	1
5.3	exec and up level commands, Name spaces, trapping errors	2
5.4	event driven programs, making applications internet aware	1
5.5	Nuts and Bolts internet programming	2
5.6	Security issues, C interface, Java interface.	1

Course Designer(s)

1. Mr. S. Vadivel - vadivels@ksrct.ac.in

60 CS L11	Advanced Java Programming	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To become familiar with the advanced features of Java Language
- To discover how to write Java applications this can communicate with Relational Databases
- To understand the possible actions can be performed using JSP
- To develop Web Applications using Servlets / JSP
- To understand the Java 8 features

Pre-requisites

Basics of Java

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Interpret the java fundamentals and essentials of inheritance	Understand
CO2	Execute the various commands in RDBMS for data management	Apply
CO3	Apply the elements available in JSP for web page design	Apply
CO4	Explore the various JSP actions in web application development	Apply
CO5	Demonstrate Java 8 features	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	2	-	-	-	2	-	3	2	3	-	-
CO2	3	3	3	3	2	-	-	-	2	-	3	2	3	-	-
CO3	3	3	3	3	3	2	-	-	2	-	3	2	3	-	-
CO4	3	3	3	3	3	2	-	-	2	-	3	2	3	3	-
CO5	3	3	3	3	2	2	-	-	3	-	3	2	3	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	15	15	20
Apply	35	35	70
Analyse	-	-	-

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Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman

Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS L11 – Advanced Java Programming								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100

Java Fundamentals* Java Architecture, Language basics, OOPS, Garbage collection, String, String buffer, Collection Framework, Packages, Exception Handling, Abstract, Interfaces.	[9]
RDBMS and JDBC** RDBMS/SQL/PL/SQL: Introduction to RDBMS, DML, DDL, Select statement, Restricting and Sorting data, Single row functions, Group functions, Joins, JDBC: Introduction, Establishing Connection, Execute query process results, Meta Data and Prepared Statement, Callable Statement and Transactions.	[9]
JSP Elements* Scripting Elements: Scriptlets, Expression, Declarations, Data Types, Variables, Operators, JSP Directive Elements: Page, Include and Taglib	[9]
JSP Actions and Expression Language JSP Actions: Standard Actions, forward, include, param, useBean, setProperty, getProperty, element, attribute, body, EL Expression, JSP Standard Tag Library, Core Library.	[9]
Java 8 Features* Lambda expressions, Method references, Functional interfaces, Stream API, Default methods, Base64 Encode Decode, Static methods in interface, Optional class, Collectors class, ForEach() method, Nashorn JavaScript Engine, Parallel Array Sorting, Type and Repeating Annotations, IO Enhancements, Concurrency Enhancements	[9]
Total Hours:	**45**
Text Book(s):	

1.	Luciano Manelli, Giulio Zambon, “Beginning Jakarta EE Web Development_ Using JSP, JSF, MySQL, and Apache Tomcat for Building Java Web Applications”, Apress, 2020.
2.	Herbert Schildt, "Java The Complete Reference", Twelfth Edition, McGraw Hill Education, 2021.
Reference(s):	
1.	https://www.javatpoint.com/jsp-tutorial
2.	https://www.geeksforgeeks.org/introduction-to-jsp/

*SDG 4 – Quality Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours

1	**Java Fundamentals**	
1.1	Java Architecture, Language basics	1
1.2	OOPS, Garbage collection	2
1.3	String, String buffer	2
1.4	Collection Framework	1
1.5	Packages	1
1.6	Exception Handling, Abstract, Interfaces	2
2	**RDBMS and JDBC**	
2.1	RDBMS/SQL/PL/SQL: Introduction to RDBMS, DML, DDL	1
2.2	Select statement, Restricting and Sorting data	1
2.3	Single row functions, Group functions	2
2.4	Joins, JDBC: Introduction, Establishing Connection	2
2.5	Execute query process results, Meta Data and Prepared Statement	2
	JSP Elements	1
3	Scripting Elements: Scriptlets	
3.1	Expression	2
3.2	Declarations	2
3.3	Data Types	2
3.4	Variables	1
3.5	Operators, JSP Directive Elements: Page, Include and Taglib	1
4	**JSP Actions and Expression Language**	
4.1	JSP Actions: Standard Actions	2
4.2	Forward, include, param	2
4.3	useBean, setProperty, getProperty	2
4.4	element, attribute, body	1
4.5	EL Expression	1
4.6	JSP Standard Tag Library, Core Library	1
5	**Java 8 Features**	
5.1	Lambda expressions	2
5.2	Method references, Functional interfaces, Stream API	2
5.3	Default methods, Base64 Encode Decode, Static methods in interface, Optional class	2
5.4	Collectors class, ForEach() method, Nashorn JavaScript Engine, Parallel Array Sorting	1
5.5	Type and Repeating Annotations	1
5.6	IO Enhancements, Concurrency Enhancements	1

Course Designer(s)

1. Mr. S. Vadivel - vadivels@ksrct.ac.in

60 CS L12	Generative AI	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To get an introduction to Generative AI
- To learn the language models and LLM architectures of generative AI
- To understand the Generative Pre-Trained Transformer
- To develop the practical applications of GPT
- To work with LangChain framework

Pre-requisites

Deep Learning

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the generative AI basics	Understand
CO2	Apply the language models and LLM architectures in generative AI	Apply
CO3	Develop the ChatGPT from Generative Pre-trained Transformer	Apply
CO4	Develop the practical application of GPT	Apply
CO5	Recognize the concept of LangChain framework	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	2	3				3	2	-	3	2	-	-
CO2	3	2	3	2	3	2	2		3	2	-	3	2	-	-
CO3	3	2	3		3	2			3	2	-	3	2	-	-
CO4	3	2	3		3			3	3	2	-	3	2	-	-
CO5	3	2	3	2	3	2	1	3	3	2	-	3	2	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10

Understand	40	40	70
Apply	10	10	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS L12 – Generative AI								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100

Introduction to Generative AI* Introduction to Artificial Intelligence – Machine Learning -Difference between AI and Machine Learning – Deep Learning – Deep Learning Model Types - Generative AI - Definition and scope of Generative AI - Overview of generative models and their applications - Importance of Generative AI in various domains - Ethical considerations and challenges	[9]
Generative AI: Language Models and LLM Architectures* Introduction to language models and their role in AI - Traditional approaches to language modeling - Deep learning-based language models and their advantages - Overview of popular LLM architectures: RNNs, LSTMs, and Transformers	[9]
Understanding GPT (Generative Pre-trained Transformer)** Introduction to GPT and its significance - Pre-training and fine-tuning processes in GPT - Architecture and working of GPT models - Overview of GPT variants and their use cases	[9]
ChatGPT: A Practical Application of GPT** Introduction to ChatGPT and its purpose - Training data and techniques for ChatGPT - Handling user queries and generating responses - Tips for improving ChatGPT's performance.	[9]
LangChain: Simplifying Development with Language Models** Introduction to LangChain and its objectives - Overview of the LangChain framework and its components - Streamlining application development using LangChain - Examples of applications built with LangChain	[9]
Total Hours:	**45**

Text Book(s):

1.	Ian Goodfellow, YoshuaBengio, Aaron Courville, “Deep Learning”, Illustrated edition, The MIT Press, 2016.
2.	Alger Fraley, “The Artificial Intelligence and Generative AI Bible”, AlgoRay Publishing, 2023.

Reference(s):

1.	David Foster, “Generative Deep Learning”, O'Reilly Media, Inc, 2019
2.	Michael Negnevitsky, “Artificial Intelligence: A Guide to Intelligent Systems Paperback”, 2011
3.	Jakub Langr, Vladimir Bok,“GANs in Action: Deep learning with Generative Adversarial Networks”, First Edition, Manning, 2019.
4.	Joseph Babcock, Raghav Bali,“Generative AI with Python and TensorFlow 2: Create images, text, and music with VAEs, GANs, LSTMs, Transformer models”, Packt Publishing Limited, 2021

***SDG 4 – Quality Education**

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction to Generative AI**	
1.1	Introduction to Artificial Intelligence	2
1.2	Machine Learning ,Difference between AI and Machine Learning	2
1.3	Deep Learning ,Deep Learning Model Types	2
1.4	Generative AI , Definition and scope of Generative AI ,Overview of generative models and their applications	1
1.5	Importance of Generative AI in various domains - Ethical considerations and challenges	1
1.6	Ethical considerations and challenges	1
2	**Generative AI: Language Models and LLM Architectures**	
2.1	Introduction to language models and their role in AI	3
2.2	Traditional approaches to language modeling	2
2.3	Deep learning-based language models and their advantages	2
2.4	Overview of popular LLM architectures: RNNs, LSTMs, and Transformers	2
3	**Understanding GPT (Generative Pre-trained Transformer)**	
3.1	Introduction to GPT and its significance	2
3.2	Pre-training and fine-tuning processes in GPT	2
3.3	Architecture and working of GPT models	3
3.4	Overview of GPT variants and their use cases	2
4	**ChatGPT: A Practical Application of GPT**	
4.1	Introduction to ChatGPT and its purpose	2
4.2	Training data and techniques for ChatGPT	3
4.3	Handling user queries and generating responses	2
4.4	Tips for improving ChatGPT's performance	2
5	**LangChain: Simplifying Development with Language Models**	

5.1	Introduction to LangChain and its objectives	2
5.2	Overview of the LangChain framework and its components	2
5.3	Streamlining application development using LangChain	2
5.4	Examples of applications built with LangChain	3
	Total	**45**

Course Designer(s)

1. Dr. S. Madhavi - madhavis@ksrct.ac.in

60 CS L13	Industrial Cloud Practices	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- Equip participants with a comprehensive understanding of cloud computing principles, AWS services, and security fundamentals to confidently initiate their cloud journey
- Enable participants to grasp fundamental concepts of cloud-based compute resources, specifically focusing on Amazon Elastic Compute Cloud (Amazon EC2) and related services, including containerization and orchestration, fostering a solid foundation for practical application
- Provide a concise understanding of OSI model layers, foundational AWS networking and security services, and proactive vulnerability prevention within the AWS cloud environment
- Immerse learners in the realm of AWS storage solutions, covering the diverse offerings of block storage, object storage, and database services, while facilitating practical skills in hosting websites through Amazon S3
- Equip participants with a comprehensive understanding of AWS monitoring and cost management tools, specifically focusing on CloudTrail, CloudWatch, and effective cloud cost optimization strategies

Pre-requisites

- Programming Skill, Computer Networks, DBMS

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Possess a clear grasp of cloud computing concepts, the advantages of cloud adoption, the significance of AWS, and the foundational knowledge to utilize key AWS services effectively, while also demonstrating an understanding of cloud security essentials and initial steps to set up an AWS account and explore its service offerings.	Understand
CO2	Understand the benefits of Amazon EC2 and its various instance types, distinguishing among billing options, comprehending dynamic scaling through features like Amazon EC2 Auto Scaling and Elastic Load Balancing, grasping containerization history and technologies, explaining AWS container offerings like Fargate and Amazon EKS, and practically creating an EC2 instance using a t2.micro instance type.	Understand

CO3	Gain the knowledge of OSI model's structure, AWS networking services including subnetting, Virtual Private Cloud (VPC), security essentials like Security Groups and Network Access Control Lists (NACLs), AWS's comprehensive security measures and global infrastructure, strategies to prevent and detect vulnerabilities, and practical skills to create a VPC with multiple subnets across different availability zones.	Understand
CO4	Understand the Amazon Elastic Block Store (EBS) and its volume types, performance distinctions, and EC2 instance store applications. They will also be adept in comprehending Amazon S3's object storage services, storage classes, tiering options, data protection, AWS database options including RDBMS and NoSQL (DynamoDB), and will have the practical ability to create an S3 bucket and host a static website.	Understand
CO5	Understand CloudTrail operations, application scenarios, cost structures, and benefits. They will also gain an understanding of Amazon CloudWatch, CloudWatch Logs, and Log Insights, along with the ability to query logs from CloudWatch Logs. Additionally, participants will become proficient in cloud financial management, cost optimization considerations, and practical skills such as sending CloudTrail logs to CloudWatch, running Log Insights queries, and validating their results.	Understand

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	-	-	-	-	-	2	-	-	-	-	-
CO2	3	2	3	2	-	-	-	-	-	2	-	2	2	-	-
CO3	3	2	3	2	2	-	-	-	3	2	-	-	-	3	-
CO4	3	3	3	2	-	-	-	-	-	2	-	-	-	3	-
CO5	3	3	2	2	2	-	-	-	3	2	-	2	2	3	-
3 – Strong; 2 – Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	40	40	70
Apply	-	-	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS L13- Industrial Cloud Practices								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100

Overview of Cloud Computing*: Exploring the Concept of Cloud Computing, Understanding the Benefits of Cloud Adoption - Selecting AWS: Reasons and Advantages - Initiating Your Journey: Getting Started with Cloud and AWS - **Introduction to AWS:** Getting Started in the AWS Cloud, Understanding the AWS Global Infrastructure - **Core Services Part I:** Explore AWS Cloud Computing Fundamentals, Delve into AWS Cloud Storage Essentials, Gain Insight into AWS Cloud Database Services - **Core Services Part II:** Understand Networking in Core AWS Services, Explore Security Aspects in Core AWS Services, Grasp Pricing Essentials of Core AWS Services - **Security Basics:** Identity and Access Management**.** **Case Study: A Kick Start - Cloud Journey:** Open AWS Cloud Account - Review the Services Offerings from Compute, Storage, Database, Networking, Security.	[9]
Compute in the Cloud*: Benefits of Amazon Elastic Compute Cloud (Amazon EC2) at a basic level, Identify the different Amazon EC2 instance types, Differentiate between the various billing options for Amazon EC2, Benefits of Amazon EC2 Auto Scaling - **Dynamic Scaling and Hosting in the Cloud:** Summarize the benefits of Elastic Load Balancing, Give an example of the uses for Elastic Load Balancing, Summarize additional AWS compute options - **Learn Container Concepts:** History of Containerization, Container Technologies, Microservices and Management - **Learn AWS Container Offerings:** Explain the functioning of Fargate, What is Container Orchestration Environment, Learn the fundamentals of AWS EKS. **Case Study:** Create EC2 Instance - t2. Micro.	[9]
Introduction to OSI Layer*: OSI Model Overview, Physical and Data Link Layers, Network and Transport Layers Session, Presentation, and Application Layers - **AWS Networking Services Fundamentals:** Learn the concept of Subnetting, Amazon Virtual Private Cloud, Security Group, NACL - **AWS Security Services Fundamentals:** Cloud Security Measures, The Worldwide Infrastructure of AWS, Ensuring Data Center Security, Adhering to Compliance and Governance, Countering DDoS Attacks - **Prevention and Detection Vulenarabities in AWS Cloud:** Introduction to AWS Entry Points, Identity and Access Management in AWS, Exploring Detective Controls, Securing Infrastructure in Cloud, Ensuring Data Protection in AWS, Incident Response Strategies in Cloud Environment. **Case Study:** Create a VPC and 2 Subnets in Different Availability Zone.	[9]
AWS Block Storage*: Amazon EBS Block Storage Service, Amazon EBS Volume Types, Performance Differentiation of Amazon EBS Volume Types, Uses for Amazon EC2 Instance Stores, Retention Options for EBS Volumes - **AWS Object Storage Basic:** Amazon S3 Object Storage Services, Amazon S3 Storage Classes Distinguishing Amazon S3 Glacier Storage Classes, Storage Class Data Tiering Options, Data Protection for Amazon S3 - **AWS Database offerings – RDBMS:** Discerning Among AWS Database Options, Exploring Amazon Relational Database Service (RDS) Value, Unveiling Amazon Aurora Architecture, Achieving High Performance with Amazon Aurora - **AWS Database offerings - NoSQL – DynamoDB:** What is NoSQL and why we need it, Amazon DynamoDB Fundamentals, Terminology and Technology Concepts. **Case Study: Host Website in S3 Bucket:** Create a S3 Bucket and Host a Static Website.	[9]

Learn the CloudTrail*: CloudTrail Operation Understanding, Surveying CloudTrail Application Scenarios, CloudTrail Cost Structure Explanation, Recognizing CloudTrail Advantages - **Understand the Cloudwatch, Cloudwatch Logs and Log Insights:** Introduction to Amazon CloudWatch, Log files from Amazon Elastic Compute Cloud (Amazon EC2) instances, AWS CloudTrail, Query the logs from Cloudwatch Logs - **Cloud Cost Management:** Understand Cloud Financial Management, Six capabilities to have to be successful in your Cloud Financial Management journey - **Cost Optimization:** Cloud Usage with Cost Consideration, Enhance Cloud Utilization, Purchase Choices Based on Commitment. **Case Study: Explore CloudTrail and CloudWatch:** Send the Logs from CloudTrail to Cloudwatch, Run LogInsights query and Validate it.	[9]
Total Hours:	**45**

Text Book(s):	
1.	https://www.amazon.in/-/hi/Neal-Davis/dp/1073015513
2.	https://www.amazon.in/Certified-Cloud-Practitioner-CLF-C01-Pearson/dp/9353945364
Reference(s):	
1	https://explore.skillbuilder.aws/learn/course/internal/view/elearning/15120/cloud-for-ceos https://explore.skillbuilder.aws/learn/course/internal/view/elearning/15009/getting-startedwithaws-cloud-essentials https://explore.skillbuilder.aws/learn/course/internal/view/elearning/454/aws-identity-andaccessmanagement-basics https://explore.skillbuilder.aws/learn/learning_plan/view/82/cloud-essentials-learning-planearn-alearning-badge https://explore.skillbuilder.aws/learn/course/internal/view/elearning/2486/introduction-tocontainerconcepts https://explore.skillbuilder.aws/learn/course/internal/view/elearning/13380/getting-startedwithaws-fargate https://explore.skillbuilder.aws/learn/course/internal/view/elearning/12439/aws-networkingbasics https://explore.skillbuilder.aws/learn/course/internal/view/elearning/4791/differencesbetweensecurity-groups-and-nacls" https://explore.skillbuilder.aws/learn/course/internal/view/elearning/13105/securityfundamentals-301 https://explore.skillbuilder.aws/learn/course/internal/view/elearning/16650/aws-blockstorageservices-getting-started https://explore.skillbuilder.aws/learn/course/internal/view/elearning/16651/aws-objectstorageservices-getting-started https://explore.skillbuilder.aws/learn/course/internal/view/elearning/1383/aws-databaseservicesnavigate-technical https://explore.skillbuilder.aws/learn/course/internal/view/elearning/324/amazondynamodbservice-primer https://explore.skillbuilder.aws/learn/course/internal/view/elearning/193/getting-started-withawscloudtrail https://explore.skillbuilder.aws/learn/course/internal/view/elearning/203/introduction-toamazoncloudwatch https://explore.skillbuilder.aws/learn/course/internal/view/elearning/191/introduction-toamazoncloudwatch-logs https://explore.skillbuilder.aws/learn/course/internal/view/elearning/265/introduction-toamazoncloudwatch-logs-insights" https://explore.skillbuilder.aws/learn/course/internal/view/elearning/1955/aws-foundationscostmanagement https://explore.skillbuilder.aws/learn/course/internal/view/elearning/10803/aws-cloud-forfinance-professionals

*SDG 9 – Industry Innovation and Infrastructure

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Overview of Cloud Computing**	
1.1	Exploring the Concept of Cloud Computing, Understanding the Benefits of Cloud Adoption	1
1.2	Selecting AWS: Reasons and Advantages	1
1.3	Initiating Your Journey: Getting Started with Cloud and AWS	1
1.4	Introduction to AWS: Getting Started in the AWS Cloud, Understanding the AWS Global Infrastructure	1
1.5	Core Services Part I: Explore AWS Cloud Computing Fundamentals, Delve into AWS Cloud Storage Essentials, Gain Insight into AWS Cloud Database Services	1
1.6	Core Services Part II: Understand Networking in Core AWS Services, Explore Security Aspects in Core AWS Services, Grasp Pricing Essentials of Core AWS Services	1
1.7	Security Basics: Identity and Access Management**.**	1
1.8	Case Study: A Kick Start - Cloud Journey: Open AWS Cloud Account	1
1.9	Review the Services Offerings from Compute, Storage, Database, Networking, and Security.	1
2.0	**Compute in the Cloud**	
2.1	Benefits of Amazon Elastic Compute Cloud (Amazon EC2) at a basic level, Identify the different Amazon EC2 instance types, Differentiate between the various billing options for Amazon EC2, Benefits of Amazon EC2 Auto Scaling	2
2.2	Dynamic Scaling and Hosting in the Cloud**:** Summarize the benefits of Elastic Load Balancing, Give an example of the uses for Elastic Load Balancing, Summarize additional AWS compute options	2
2.3	Learn Container Concepts: History of Containerization, Container Technologies, Micro services and Management	2
2.4	Learn AWS Container Offerings: Explain the functioning of Fargate, What is Container Orchestration Environment, Learn the fundamentals of AWS EKS.	2
2.5	Case Study: Create EC2 Instance - t2. Micro	1
3.0	**Introduction to OSI Layer**	
3.1	OSI Model Overview, Physical and Data Link Layers, Network and Transport Layers Session, Presentation, and Application Layers	2
3.2	AWS Networking Services Fundamentals: Learn the concept of Subnetting, Amazon Virtual Private Cloud, Security Group, NACL	1
3.3	AWS Security Services Fundamentals: Cloud Security Measures, The Worldwide Infrastructure of AWS, Ensuring Data Center Security, Adhering to Compliance and Governance, Countering DDoS Attacks	2
3.4	Prevention and Detection Vulenarabities in AWS Cloud: Introduction to AWS Entry Points, Identity and Access Management in AWS, Exploring Detective Controls, Securing Infrastructure in Cloud, Ensuring Data Protection in AWS, Incident Response Strategies in Cloud Environment	2
3.5	Case Study: Create a VPC and 2 Subnets in Different Availability Zone	2

4.0	**AWS Block Storage**	
4.1	Amazon EBS Block Storage Service, Amazon EBS Volume Types, Performance Differentiation of Amazon EBS Volume Types, Uses for Amazon EC2 Instance Stores, Retention Options for EBS Volumes.	2
4.2	AWS Object Storage Basic: Amazon S3 Object Storage Services, Amazon S3 Storage Classes Distinguishing Amazon S3 Glacier Storage Classes, Storage Class Data Tiering Options, Data Protection for Amazon S3	2
4.3	AWS Database offerings – RDBMS: Discerning Among AWS Database Options, Exploring Amazon Relational Database Service (RDS) Value, Unveiling Amazon Aurora Architecture, Achieving High Performance with Amazon Aurora.	1
4.4	AWS Database offerings - NoSQL – DynamoDB**:** What is NoSQL and why we need it, Amazon DynamoDB Fundamentals, Terminology and Technology	2
	Concepts.	
4.5	Case Study: Host Website in S3 Bucket**:** Create a S3 Bucket and Host a Static Website	2
5.0	**Learn the CloudTrail**	
5.1	CloudTrail Operation Understanding, Surveying CloudTrail Application Scenarios, CloudTrail Cost Structure Explanation, Recognizing CloudTrail Advantages.	2
5.2	Understand the Cloudwatch, Cloudwatch Logs and Log Insights: Introduction to Amazon CloudWatch, Log files from Amazon Elastic Compute Cloud (Amazon EC2) instances, AWS CloudTrail, Query the logs from Cloudwatch Logs.	2
5.3	Cloud Cost Management: Understand Cloud Financial Management, Six capabilities to have to be successful in your Cloud Financial Management journey.	2
5.4	Optimization: Cloud Usage with Cost Consideration, Enhance Cloud Utilization, Purchase Choices Based on Commitment.	2
5.5	Case Study: Explore CloudTrail and CloudWatch: Send the Logs from CloudTrail to Cloudwatch, Run LogInsights query and Validate it	1

Course Designer(s)

1. M. Varshana Devi – varshanadevi@ksrct.ac.in

K.S.Rangasamy College of Technology (Autonomous)

Curriculum & Syllabi for

B. E Computer Science Engineering Minor Degree - Full Stack Development

(For the batch admitted in 2024-2025)

R 2022

Accredited by NAAC with 'A++' grade,
Approved by AICTE, Affiliated to Anna University, Chennai.
KSR Kalvi Nagar, Tiruchengode – 637 215. Namakkal District, Tamil Nadu, India.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MINOR DEGREE PROGRAMME - FULL STACK DEVELOPMENT LIST OF COURSES

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 CS M01	Java Programming	PE	3	3	0	0	3
2.	60 CS M02	Front End Development	PE	3	3	0	0	3
3.	60 CS M03	Database Technology	PE	3	3	0	0	3
4.	60 CS M04	Node JS	PE	3	3	0	0	3
5.	60 CS M05	React JS	PE	3	3	0	0	3
6.	60 CS M06	Enterprise Integration	PE	3	3	0	0	3
			Total	19	18	0	0	18

60 CS M01	Java Programming	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn the fundamental element of the Java language
- To understand the concept of Array and Strings
- To apply the knowledge of Collections and Generics
- To learn about Exception and Threads
- To enhance the knowledge in Java Database Connectivity

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Demonstrate the concept of classes, objects and communicate classes over objects using methods	Understand
CO2	Apply the concepts of Arrays and String	Apply
CO3	Apply the Collections and Generics	Apply
CO4	Implement the concept of Exception Handling and Threads	Apply
CO5	Develop an application to enrich the knowledge in database Connectivity	Apply

Mapping with Programmes Outcome

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	3	-	-	-	3	3	2	3	2	-	-
CO2	3	3	3	-	3	2	-	2	3	3	2	3	3	2	-
CO3	2	3	3	-	3	-	-	2	3	3	2	3	3	2	-
CO4	3	3	3	2	3	2	-	-	3	3	2	3	3	2	-
CO5	2	3	3	2	3	2	-	-	3	3	2	3	3	-	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	-	-	-
Evaluate	-	-	-

Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS M01- Java Programming								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Java Fundamentals Java Fundamentals: Java Architecture, Language basics, conditional statements, Flow Control Statements, OOPS / Inheritance: Classes and Objects, Encapsulation and Abstraction, Inheritance, Overriding and overloading, Garbage collection.	[9]
Arrays and String Arrays: One Dimensional Array and Multi-dimensional Array, String: Immutable String, Substring, String Comparison, String methods, String Buffer and String Builder.	[9]
Collections and Generics Collection Framework: Introduction to collection, Set, List, Map and Generics, Vector, Stack, Priority Queue, Iterator and Collection Interface.	[9]
Exception Handling and Threads Exception Handling: Introduction, Exception Types, and Keywords: Try, catch, finally, throw and throws. Threads: Creating threads by Thread class and Runnable Interface, Thread lifecycle, Thread priorities.	[9]
RDBMS and JDBC RDBMS **:** Introduction to SQL,DDL,DML,DCL,TCL Commands, JDBC: Introduction, Establishing Connection and Transactions.	[9]
Total Hours:	**45**
Text Book(s):	
1 Herbert Schildt, " The Java 2: Complete Reference", Fifth edition, TMH, 2002.	
2 Jim Keogh, " J2EE: The Complete Reference", First edition, TMH, 2002.	
Reference(s):	
1. www.javatpoint.com	

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Java Fundamentals**	
1.1	Java Architecture, Language basics	2
1.2	conditional statements, Flow Control Statements	2
1.3	OOPS / Inheritance: Classes and Objects	2
1.4	Encapsulation and Abstraction, Inheritance	2
1.5	Overriding and overloading, Garbage collection	1

2.0	**Arrays and String**	
2.1	Arrays: One Dimensional Array and Multi-dimensional Array	2
2.2	String: Immutable String, Substring	2
2.3	String Comparison	1
2.4	String methods	2
2.5	String Buffer and String Builder	2

3.0	**Collections and Generics**	
3.1	Collection Framework: Introduction to collection	2
3.2	Set, List	2
3.3	Map and Generics	1
3.4	Vector, Stack	2
3.5	Priority Queue	1
3.6	Iterator and Collection Interface	1
4.0	**Exception Handling and Threads**	
4.1	Exception Handling: Introduction	2
4.2	Exception Types	1
4.3	Keywords: Try, catch	1
4.4	Finally, throw and throws	2
4.5	Threads: Creating threads by Thread class and Runnable Interface	1
4.6	Thread lifecycle	1
4.7	Thread priorities	1
5.0	**RDBMS and JDBC**	
5.1	RDBMS **:** Introduction to SQL	2
5.2	DDL,DML	2
5.3	DCL,TCL Commands	2
5.4	JDBC: Introduction	2
5.5	Establishing Connection and Transaction	1

Course Designer(s)

1. Mr. S. Vadivel – vadivels@ksrct.ac.in

60 CS M02	Front End Development	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the communication between web browsers and servers
- To enhance the knowledge of how hierarchy of objects are used in HTML
- To design a web page by utilizing CSS components

- To Incorporate JavaScript variables, operators and functions in web pages
- To design of single-page applications and how Angular JS facilitates their development

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand and create interactive web pages	Understand
CO2	Analyze different types of HTML tags, their functionality and attributes and learn the basics of web services	Analyse
CO3	Implement CSS to control the appearance of web pages and denote the background elements and media types	Apply
CO4	Interpret JavaScript variables, operators and functions in web pages and manipulate HTML forms to validate user inputs	Apply
CO5	Implement the features of AngularJS with the various effects of elements and events	Apply

Mapping with Programmes Outcome

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	2	-	-	-	2	2	-	2	-	3	-
CO2	3	3	3	-	3	3	-	2	2	2	-	2	2	3	-
CO3	3	3	3	3	3	2	-	2	2	2	-	2	2	3	-
CO4	3	3	2	2	3	3	-	2	2	2	-	2	2	3	-
CO5	3	3	3	-	3	-	-	-	2	2	-	3	2	3	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	30
Apply	20	30	50
Analyse	10	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS M02- Front End Development								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total

V	3	0	0	45	3	40	60	100

Introduction to Web Essentials History of Web and Internet Basic – HTTP Request and Response Message – Introduction to Front end technology- Client – Server Computing: Web Client – Web Servers.	[9]
HTML Traditional HTML and XHTML: History – Basic HTML Syntax and Semantics – Some Fundamental HTML Elements – Lists – Creating Table - Linking document - Frames - Graphics to HTML- Forms – HTML5 Document Structure Changes.	[9]
CSS Basics of CSS, CSS properties for manipulating texts, background, colors, Gradients, Shadow Effects, borders, margins, paddings, transformations, transitions and animations, etc., CSS box modal and CSS Flex, Positioning systems of CSS, CSS media queries.	[9]
JavaScript Basics of JavaScript and Client-side scripting language, JavaScript syntaxes for variables, functions, branches and repetitions. JavaScript alert, prompt and confirm. Objects in JavaScript, Access/Manipulate web browser elements using DOM Structure, forms and validations, JavaScript events.	[9]
Angular JS Introduction to Angular JS: HTML and Bootstrap CSS Primer - JavaScript Primer - Single Page Application –MVC Architecture – first Application of AngularJS- Binding –Template Directives – Elements – Events. **Practice:** • Create a static webpage using table tags of HTML • Develop and demonstrate the usage of inline, internal and external style sheet using CSS • Design a HTML code to create a frameset having header, navigation and Content sections with CSS • Design a Java Script program which makes use of Java Script's inbuilt objects • Design HTML form for keeping student record and validate it using Java script • Develop a fully functional website using Angular JS	[9]
Total Hours:	**45**
Text Book(s):	

1.	H.M.Deitel, P.J.Deitel, A.B.Goldberg, “INTERNET and WORLD WIDE WEB – How to program”, Pearson education, Third Edition, 2014.
2.	Ken Williamson,” Learning AngularJS: A Guide to AngularJS Development”, O' Reilly,2015
Reference(s):	
1.	Norton D and Schildt H, “Java 2: The complete Reference”, TMH, 2000.
2.	Jeffrey C.Jackson, "Web Technologies-A Computer Science Perspective", Pearson Education, 2017.
3.	Paul Deitel, Harvey Deitel and Abbey Deitel,” Internet and World Wide Web How to Program”, 5th Edition, Pearson Education, 2018.
4.	Robert. W. Sebesta, "Programming the World Wide Web", 8th Edition, Pearson Education, 2015.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Web Essentials**	
1.1	History of Web and Internet Basic	2
1.2	HTTP Request and Response Message	2
1.3	Introduction to Front end technology	2
1.4	Client	1
1.5	Server Computing: Web Client	1
1.6	Web Servers	1
2.0	**HTML**	
2.1	Traditional HTML and XHTML: History	1
2.2	Basic HTML Syntax and Semantics	1
2.3	Some Fundamental HTML Elements	1
2.4	Lists – Creating Table	2
2.5	Linking document - Frames	2
2.6	Graphics to HTML- Forms	1
2.7	HTML5 Document Structure Changes	1
3.0	**CSS**	
3.1	Basics of CSS	1
3.2	CSS properties for manipulating texts	1
3.3	Background, colors, Gradients	2
3.4	Shadow Effects, borders, margins	1
3.5	Paddings, transformations, transitions and animations, etc.,	1
3.6	CSS box modal and CSS Flex	1
3.7	Positioning systems of CSS	1
3.8	CSS media queries	1
4.0	**JavaScript**	
4.1	Basics of JavaScript and Client-side scripting language	2
4.2	JavaScript syntaxes for variables	1
4.3	functions, branches and repetitions	1
4.4	JavaScript alert, prompt and confirm	2
4.5	Objects in JavaScript	1
4.6	Access/Manipulate web browser elements using DOM Structure	1
4.7	forms and validations, JavaScript events	1
5.0	**Angular JS**	
5.1	Introduction to AngularJS: HTML and Bootstrap CSS Primer	1
5.2	JavaScript Primer	1
5.3	Single Page Application	1
5.4	MVC Architecture	1

5.5	first Application of AngularJS	1
5.6	Binding –Template Directives	2
5.7	Elements – Events	2

Course Designer(s)

Mr. K. Dineshkumar – dineshkumark@ksrct.ac.in

60 CS M03	Database Technology	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To familiarize the students with various data models and query language
- To Gain knowledge on data storage and indexing concepts
- To expose the fundamentals of transaction processing and recovery concepts
- To make the students aware of the various current trends in database system
- To know the current trends of various databases

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the knowledge of data base systems and various data models	Understand
CO2	Implement the concept of Data Definition Language and Data Manipulation Language and apply the various Normal Forms in database design	Apply
CO3	Understand the knowledge of secondary storage device and apply the concepts of hashing, B Tree, B+ Tree in indexing to retrieve the data	Apply
CO4	Apply the various concurrency control techniques in database transactions and recovery techniques	Apply
CO5	Classify the recent databases such and Express the knowledge of data warehousing and data mining	Understand

Mapping with Programmes Outcome

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	2	2	2	-	3	-	-	2	-	2	-
CO2	3	3	2	-	2	2	2	-	3	-	-	2	3	3	-
CO3	3	3	2	-	2	-	-	-	-	-	-	-	2	3	-
CO4	3	3	2	-	2	2	2	-	3	-	-	-	-	3	-
CO5	3	3	2	-	2	2	2	-	-	-	-	-	-	3	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	30	30	50
Apply	20	20	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS M03- Database Technology

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction and Conceptual Modeling Introduction Database systems – DBMS Applications – Purpose of DBMS – Views of Data - Database System Architecture –Data Storage and Querying – DB Users and Administrators - Data Models – ER model – Relational Model – Relational Algebra and Calculus.	[9]
Relational Model Introduction to SQL – Intermediate SQL – Advanced SQL– Triggers – Functions and Procedures –Embedded SQL- Normalization for Relational Databases (up to 5NF).	[9]
Data Storage and Indexing Concepts Record storage and Primary file organization –RAID – Operations on Files- Heap FileSorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree..	[9]
Transaction Management Transaction – Transaction Concepts- Transaction Model- Desirable properties of Transaction- Schedule and Recoverability- Serializability – Concurrency Control – Types of Locks- Two Phase locking- Time stamp based concurrency control – Recovery Techniques – Concepts- Immediate Update- Deferred Update.	[9]
Current Trends Object Oriented Databases –Distributed databases- Homogenous and Heterogeneous-Distributed data Storage –Distributed Transaction – Commit Protocols - Data Mining– Data Mining Applications –Data Warehousing.	[9]
Total Hours:	**45**
Text Book(s):	
1 Abraham Silberschatz, Henry F. Korth and S. Sudarshan - "Database System Concepts", sixth Edition, McGraw-Hill, 2011.	
2 RamezElmasri and Shamkant B. Navathe, "Fundamental Database Systems", Fifth Edition, Pearson Education, 2009.	
Reference(s):	

1.	Raghu Ramakrishnan, “Database Management System”, Tata McGraw-Hill Publishing Company, 2003.
2.	Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- “Database System Implementation”- Pearson Education- 2003.
3.	Peter Rob and Corlos Coronel- “Database System, Design, Implementation and Management”, Thompson Learning Course Technology- Fifth edition, 2003.
4.	Rajiv Chopra, “ Database Management System a Practical Approach “, S.Chand & co.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction and Conceptual Modeling**	
1.1	Introduction Database systems	1
1.2	DBMS Applications – Purpose of DBMS	2
1.3	Views of Data - Database System Architecture	2
1.4	Data Storage and Querying	1
1.5	DB Users and Administrators	1
1.6	Data Models – ER model	1
1.7	Relational Model – Relational Algebra and Calculus	1
2.0	**Relational Model**	
2.1	Introduction to SQL	2
2.2	Intermediate SQL	1
2.3	Advanced SQL– Triggers	2
2.4	Functions and Procedures	1
2.5	Embedded SQL	1
2.6	Normalization for Relational Databases (up to 5NF).	2
3.0	**Data Storage and Indexing Concepts**	
3.1	Record storage and Primary file organization	1
3.2	RAID – Operations on Files	2
3.3	Heap File- Sorted Files	2
3.4	Hashing Techniques	1
3.5	Index Structure for files	1
3.6	Different types of Indexes	1
3.7	B-Tree - B+Tree.	1
4.0	**Transaction Management**	
4.1	Transaction – Transaction Concepts	1
4.2	Transaction Model- Desirable properties of Transaction	1
4.3	Schedule and Recoverability	1
4.4	Serializability – Concurrency Control	2

4.5	Types of Locks- Two Phase locking	1
4.6	Time stamp based concurrency control	1
4.7	Recovery Techniques – Concepts	1
4.8	Immediate Update- Deferred Update.	1
5.0	**Current Trends**	
5.1	Object Oriented Databases	1
5.2	Distributed databases	1
5.3	Homogenous and Heterogeneous	1
5.4	Distributed data Storage	1
5.5	Distributed Transaction	1
5.6	Commit Protocols - Data Mining	2
5.7	Data Mining Applications –Data Warehousing.	2

Course Designer(s)

1. Dr. A. Gananabaskaran - gnanabaskarana@ksrct.ac.in

60 CS M04	Node JS	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn the runtime web development for easily building fast and scalable network applications
- To enhance the knowledge in event-driven and real-time applications that run across distributed devices
- To learn the streams and file systems in Node Js
- To acquire the knowledge on web development and database connectivity
- To Acquire the knowledge of various file operations using file systems

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the fundamental structure of Node.js platform	Understand
CO2	Apply the concepts of NPM	Apply
CO3	Implement the concepts of streams and file systems	Apply
CO4	Gain the knowledge of web content using node.js	Apply
CO5	Annotate the various file operations using file systems	Understand

Mapping with Programmes Outcome

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	2	-	3	-	-	2	3	2	-	3	2	-	-
CO2	2	3	2	-	3	-	-	2	3	2	-	3	2	-	-
CO3	2	3	2	2	3	-	-	2	3	2	-	3	2	-	-

CO4	2	3	2	2	3	-	-	2	3	2	-	3	2	-	-
CO5	2	3	2	-	3	-	-	2	3	2	-	3	2	-	-
3 – Strong; 2 – Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Computer Science and Engineering

60 CS M04- Node JS

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction to Node.js The environment of Node.js - Benefits and Features - Install Node.js on Windows - Console and Web programs - Node.js REPL Commands.	[8]
NPM Node.js Package Manager - Installing modules using NPM - Node.js Command Line Options - Node.js Errors- Node.js DNS - Node.js Net.	[9]
Streams and File Systems Node.js Creating Buffers - Node.js Streams - Node.js Piping Streams - Node.js Chaining Streams - Node.js File Systems.	[11]
Web Development Node.js Web Module - Node.js html form handling - Node.js Database Connectivity.	[9]

File System Fs.readFile - Writing a File - Writing a file asynchronously - Opening a file - Deleting a file - Other IO Operations. **Hands on:** 1. Read the text file and print the content using file system module. 2. Design the employee web page using html. Using node js program call the HTML file which display the output in browser. 3. Sample buffer program for different operations • Creating buffer • Concatenating the buffer • Copying buffer • Buffer length • Compare • Slice • Converting buffer to JSON file 4. Read the data from one text file and write the content to another text file using readerStream, writerStream. 5. Sample Node.js program using pipe and chaining using streams. 6. Node.js program for various file operation using File System • Reading the file • Writing the file • Truncating the file • Deleting the file 7. Design the sample student registration form using html and call these html file using node.js, which will display output in browser. 8. Mini Project with Node.js database connectivity.	[8]
Total Hours:	**45**
Text Book(s):	
1. AzatMardan, “Practical Node. Js Building Real - World Scalable Web Apps”, APRESS Publication, 2018.	
2. https://www.w3schools.com/nodejs,	
Reference(s):	
1. Alex Young, Bradley Meck, Mike Cantelon, “Node.js in Action”, Manning Publications, 2017.	
2. Alex banks & Eve Porcello, “Learning React”, O’Reilly Publications, 2017.	
3. https://www.w3schools.com/REACT/default.asp	
4 https://www.tutorialspoint.com/nodejs/nodejs_introduction.htm,	

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Node.js**	
1.1	The environment of Node.js	1
1.2	Benefits and Features	2
1.3	Install Node.js on Windows	2
1.4	Console and Web programs	1

1.5	Node.js REPL Commands	2
2.0	**NPM**	
2.1	Node.js Package Manager	2
2.2	Installing modules using NPM	1
2.3	Node.js Command Line Options	2
2.4	Node.js Errors	1
2.5	Node.js DNS	1
2.6	Node.js Net	2
3.0	**Streams and File Systems**	
3.1	Node.js Creating Buffers	2
3.2	Node.js Streams	2
3.3	Node.js Piping Streams	2
3.4	Node.js Chaining Streams	2
3.5	Node.js File Systems	3
4.0	**Web Development**	
4.1	Node.js Web Module	3
4.2	Node.js html form handling	3
4.3	Node.js Database Connectivity	3
5.0	**File System**	
5.1	Fs.readFile	1
5.2	Writing a File	1
5.3	Writing a file asynchronously	2
5.4	Opening a file	1
5.5	Deleting a file	1
5.6	Other IO Operations.	2

Course Designer(s)

1. Ms. J. Mythili – mythili@ksrct.ac.in

60 CS M05	React JS	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the fundamentals of web programming and client side scripting.
- To learn server side development using NodeJS.
- To understand API development with Express Framework.
- To understand and architect databases using NoSQL and SQL databases.
- To learn the advanced client side scripting and ReactJS framework

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Write client side scripting HTML, CSS and JS.	Remember
CO2	Implement and architect the server side of the web application.	Apply
CO3	Implement Web Application using NodeJS.	Apply
CO4	Architect NoSQL databases with MongoDB.	Apply
CO5	Implement a full-stack Single Page Application using React, NodeJS and MongoDB and deploy on Cloud.	Apply

Mapping with Programmes Outcome

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	-	-	3	-	-	-	3	2	-	3	2	-	-
CO2	2	3	-	-	3	-	-	-	3	2	-	3	2	-	-
CO3	2	3	-	-	3	-	-	-	3	2	-	3	2	-	-
CO4	2	3	-	-	3	-	-	-	3	2	-	3	2	-	-
CO5	2	3	-	-	3	-	-	-	3	2	-	3	2	-	-
3 – Strong; 2 – Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Computer Science and Engineering								
60 CS M05- React JS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction to React What is React? - Setting up the development environment: Installing Node.js and npm, Creating a React app using Create React App - Understanding JSX - Components and Props: Functional vs. Class Components, Passing props to components. **State and Lifecycle** State in React: Using the useState Hook, Class component state - Lifecycle Methods: useEffect Hook, ComponentDidMount, ComponentDidUpdate, ComponentWillUnmount.	[9]
Event Handling and Conditional Rendering Handling Events: Adding event listeners in React, Synthetic events - Conditional Rendering: if/else statements, Ternary operators, Short-circuit evaluation. **Lists and Keys** Rendering Lists: Using the map() function, Keys in React – Forms: Controlled vs. uncontrolled components, Handling form submissions.	[9]

Advanced Topics in React Context API: Creating context, Consuming context - React Router: Setting up React Router, Route parameters and navigation. **State Management** Redux: Setting up Redux, Actions, reducers, and the store - Recoil and other state management libraries.	[9]
Hooks Custom Hooks: Creating and using custom hooks - useReducer and useContext **Performance Optimization** Memoization: useMemo and useCallback - React.memo: PureComponent.	[9]
Testing React Applications Unit Testing with Jest, Testing Components with React Testing Library, End-to-End Testing with Cypress. **Deployment and Best Practices** Building and Deploying React Apps: Using Vercel, Netlify, or other platforms. **Best Practices** Hacker Rank - Leet Code.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Stoyan Stefanov, “React – Up & Running: Building Web Applications”, Second Edition, O'Reilly, 2021.
2.	Alex Banks and Eve Porcello, “Learning React: Modern Patterns for Developing React Apps”, O’Reilly Media, Inc, 2nd Edition, 2020.
Reference(s):	
1.	Anthony Accomazzo, Nathaniel Murray, Ari Lerner, “Full stack React: The Complete Guide to ReactJS and Friends”, Fullstack.IO,, 2017.
2.	React JS Official Document.
3.	FreeCodeCamp React Course.
4.	React & Redux Complete Tutorial.

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to React**	

1.1	What is React?	1
1.2	Setting up the development environment: Installing Node.js and npm, Creating a React app using Create React App	2
1.3	Understanding JSX	2
1.4	Components and Props: Functional vs. Class Components, Passing props to components	1
1.5	State and Lifecycle State in React: Using the useState Hook, Class component state	2
1.6	Lifecycle Methods: useEffect Hook, Component Did Mount, Component Did Update, Component Wil lUnmount	1
2.0	**Event Handling and Conditional Rendering**	
2.1	Handling Events: Adding event listeners in React, Synthetic events	2
2.2	Conditional Rendering: if/else statements, Ternary operators, Short-circuit evaluation.	2
2.3	Lists and Keys Rendering Lists: Using the map() function, Keys in React	2
2.4	Forms: Controlled vs. uncontrolled components, Handling form submissions.	3
3.0	**Advanced Topics in React**	
3.1	Context API: Creating context, Consuming context	2
3.2	React Router: Setting up React Router, Route parameters and navigation	3
3.3	State Management Redux: Setting up Redux, Actions, reducers, and the store	2
3.4	Recoil and other state management libraries	2
4.0	**Hooks**	
4.1	Custom Hooks: Creating and using custom hooks	3
4.2	UseReducer and useContext	3
4.3	Performance Optimization Memoization: useMemo and useCallback	2
4.4	React.memo: PureComponent.	1
5.0	**Testing React Applications**	
5.1	Unit Testing with Jest	1
5.2	Testing Components with React Testing Library	1
5.3	End-to-End Testing with Cypress	1
5.4	Deployment and Best Practices Building and Deploying React Apps: Using Vercel, Netlify, or other platforms	2
5.5	Best Practices Hacker Rank - Leet Code	2
5.6	Other IO Operations.	2

Course Designer(s)

1. Ms. S. Mithuna – mithuna@ksrct.ac.in

60 CS M06	Enterprise Integration	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To become familiar with the advanced features of Java Language
- To discover how to write Web applications
- To understand the possible function can be performed using JavaScript
- To develop Web Applications using Servlets
- To understand the process of deploying EJB in popular servers like Tomcat

Pre-requisites

Basics of Java

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Interpret the java fundamentals and essentials of inheritance	Understand
CO2	Execute the various tags in HTML and CSS	Apply
CO3	Apply the events available in JavaScript for web page design	Apply
CO4	Explore the various Servlet actions in web application development	Apply
CO5	Demonstrate the process of developing EJB	Apply

Mapping with Programmes Outcome

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	3	-	-	-	3	2	-	3	2	-	-
CO2	3	3	-	-	3	-	-	-	3	2	-	3	2	-	-
CO3	3	3	-	-	3	-	-	-	3	2	-	3	2	-	-
CO4	3	3	-	-	3	-	-	-	3	2	-	3	2	-	-
CO5	3	3	-	-	3	-	-	-	3	2	-	3	2	-	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	30	30	30
Apply	20	20	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022				
B.E – Computer Science and Engineering				
60 CS M06- Enterprise Integration				
Semester	**Hours/Week**		**Credit**	**Maximum Marks**

	L	T	P	**Total Hours**	C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Java Fundamentals Java Architecture, Language basics, OOPS, Garbage collection, String, String buffer, Collection Framework, Packages, Exception Handling, Abstract, Interfaces.	[9]
HTML and CSS HTML Introduction – Basic Tags - Lists – Images- Hyperlink – Table – Form, CSS Introduction –Selector-Types.	[9]
JavaScript Introduction to JavaScript - JavaScript Syntax - Datatype - Variable - Array -Operator and Expression - Looping -Constructor - Function - Events -JavaScript validation.	[9]
Servlet Servlet Introduction – Life cycle – Servlet Interface – RequestDispatcher – sendRedirect – HttpSession - Cookies.	[9]
EJB (Enterprise JavaBeans) Introduction to EJB - Session beans, entity beans, and message-driven beans, EJB 3.x Features - Annotations and simplifications.	[9]
Total Hours:	**45**
Text Book(s):	

1.	Luciano Manelli, Giulio Zambon, “Beginning Jakarta EE Web Development_ Using JSP, JSF, MySQL, and Apache Tomcat for Building Java Web Applications”, Apress, 2020.
2.	Herbert Schildt, "Java The Complete Reference", Twelfth Edition, McGraw Hill Education, 2021.
3.	Peter Späth, “Beginning Jakarta EE - Enterprise Edition for Java From Novice to Professional”, Apress, 2019.
Reference(s):	
1.	https://www.javatpoint.com/jsp-tutorial
2.	https://www.geeksforgeeks.org/introduction-to-jsp/

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Java Fundamentals**	
1.1	Java Architecture	1
1.2	Language basics	2
1.3	OOPS, Garbage collection	2
1.4	String, String buffer	1
1.5	Collection Framework	2
1.6	Packages, Exception Handling	1
1.7	Abstract, Interfaces	
2.0	**HTML and CSS**	

2.1	HTML Introduction	1
2.2	Basic Tags	1
2.3	Lists	1
2.4	Images	1
2.5	Hyperlink	1
2.6	Table - Form	2
2.7	CSS Introduction	1
2.8	Selector-Types	1
3.0	**JavaScript**	
3.1	Introduction to JavaScript - JavaScript Syntax	1
3.2	Datatype - Variable	1
3.3	Array	1
3.4	Operator and Expression	1
3.5	Looping	1
3.6	Constructor	1
3.7	Function	1
3.8	Events	1
3.9	JavaScript validation	1
4.0	**Servlet**	
4.1	Servlet Introduction	1
4.2	Life cycle	1
4.3	Servlet Interface	2
4.4	RequestDispatcher	1
4.5	sendRedirect	1
4.6	HttpSession	1
4.7	Cookies	2
5.0	**EJB (Enterprise JavaBeans)**	
5.1	Introduction to EJB	1
5.2	Session beans	1
5.3	entity beans	1
5.4	message-driven beans	2
5.5	EJB 3.x Features	2
5.6	Annotations and simplifications	2

Course Designer(s)

1. Mr. S. Vadivel - vadivels@ksrct.ac.in