K. S. Rangasamy College of Technology

(Autonomous)

CURRICULUM AND SYLLABI

FOR

B.E. Computer Science and Engineering

(Artificial Intelligence and Machine Learning)

(For the batch admitted in 2022 – 2023)

R2022

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 CSE (Artificial Intelligence and Machine Learning)

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 (AIML) 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.

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 analysis: Identify, formulate, review research literature, and Analyse 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.

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

Program Specific Outcomes (PSOs) for B.E. CSE (AIML) 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: Analyse 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. CSE (Artificial Intelligence and Machine Learning) 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
PEO1	3	1	3	2	2	1	1	1	2	2	3	1
PEO2	3	3	3	2	2	1	1	1	2	2	3	1
PEO3	3	2	3	2	2	1	1	1	3	2	3	1

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

MAPPING-UG- CSE (Artificial Intelligence and Machine Learning)

Year	Sem	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I	I	Professional English-I								2	3	3	2	3
		Matrices and Calculus	3	2			2							
		Foundations of Artificial Intelligence	3	3	1	3	3			2				1
		Engineering Graphics	3	3	3		3			3				
		C Programming	3	3	3		3				2	2		2
		Environmental Studies and Climate Change	3	2			3	3	3	2				2
		C Programming Laboratory	3	3	3		3				2	2		2
		Fabrication and Reverse Engineering Laboratory	3	2	3			2	2		3			3
I	II	Professional English-II								2	3	3	2	3
		Linear Algebra and Discrete Mathematics	3	3			2							
		Physics for Computer Technology	3									2		
		Engineering Chemistry	3	3										
		Basic Electrical and Electronics Engineering	3	3				2	2		3	2		2
		Python Programming	3	2	3	3					2	2	2	2
		Heritage of Tamils*							3	3		2		3
		Engineering Physics and Chemistry Laboratory	3	2				3						
		Python Programming Laboratory	3	2	3	3					2	2	2	2
		Career Skill Development I								2	3	3	2	3

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

II	III	Probability and Random Processes	3	2			2							
		Data Structures	3	3	2	3	2	2	2	2	3	2		2
		Java Programming	3	3	3	2	3			2	3	3	2	3
		Formal Language and Automata Theory	3	3	2	2				2		2	2	2
		Computer Architecture	3	3	2		2	2	2		3			2
		Universal Human Values*						3	3	3	3	3	2	3
		Tamils and Technology/ தமிழரும் தொழில் நுட்பமும்*							3	3		2		3
		Data Structures Laboratory	3	3	2	3	2	2	2	3	3	2		2
		Java Programming Laboratory	3	3	3	2	3			2	3	3	2	3
		Career Skill Development – II	3	3	3	3		2				2	3	3
		Internship												
II	IV	Inferential Statistics and Numerical Methods	3	3			2							
		Design and Analysis of Algorithms	3	3	3	2	3					3		
		Artificial Intelligence	3	3	2	2	2	2						2
		Software Engineering	3	3	3	3	3		2	2	3	2	3	
		Database Management Systems	3	3	2		2	2	2		2			2
		Open Elective I												
		Startups and Entrepreneurship	3	3	3	2	2	3	2	2	1	2	2	2
		Artificial Intelligence Laboratory	3	3	2	2	2	2	2	2	2	2	2	2
		Database Management Systems Laboratory	3	3	3		3	3	2		2	2		2
		Career Skill Development III	3	3	3	3	2					2	3	3
		Internship												
III	V	Machine Learning Techniques	3	3	3	3	3							
		Network Infrastructure	3	3				2						
		Operating System	3	3	3		2							
		Design Thinking	3	3	2	3	2	2	2	3	3	2	3	2
		Professional Elective I												
		Open Elective II												
		Machine Learning Techniques Laboratory	3	2	3	3	3							
		Network Infrastructure Laboratory	3	2			3							
		Career Skill Development IV								2	3	3	2	3
		Internship												
III	VI	Engineering Economics and Financial Accounting	3	3	3	3	3	2	2	2			3	3
		Visual Analytics in AI	3	2	3	3	3							
		Deep Learning	3	2		3	3							
		Web Technology	3	2	2		3							
		Professional Elective II												
		Open Elective III												
		Visual Analytics in AI Laboratory	3		2	3	3							
		Deep Learning Laboratory	3	2			3							
		Mini Project												

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

		Comprehensive Test	3	3	2	2					1	2	2	3
		Internship												
IV	VII	Machine vision	3	2	2	3	3							
		Speech and Language Processing	3	2	3		3							
		Explainable AI	3	2	3	2	3							
		Professional Elective III												
		Professional Elective IV												
		Research Skill Development												
		NCC/NSS/NSO/YRC/RRC/Fine Arts*	3	2	1	1	3	3	3	3	3	3		
		Machine vision Laboratory	3	3			3							
		Speech and Language Processing Laboratory	3	3			3							
		Project Work – Phase I	3	3	3	3	3	3	3	3	3	3	3	3
		Internship												
IV	VIII	Professional Elective V												
		Project Work – Phase II	3	3	3	3	3	3	3	3	3	3	3	3
		Internship												

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

K.S. RANGASAMY COLLEGE OF TECHNOLOGY

Credit Distribution for B.E CSE (AIML) Programme – 2022 – 2023 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**	**14.63**
3.	ES	14	3	-	-	-	-	-	-	**17**	**10.37**
4.	PC	-	6	17	16	16	13	13	-	**81**	**49.6**
5.	PE	-	-	-	-	3	3	6	3	**15**	**9.14**
6.	OE	-	-	-	3	3	3	-	-	**9**	**5.49**
7.	CG	-	-	-	-	-	-	2	8	**10**	**6.13**
8.	MC	MCI	-	MCII	MCIII	-	-	-	-	**-**	**-**
9.	AC	-	-	-	-	-	-	ACI	-	**-**	**-**
Total		**20**	**23**	**21**	**23**	**22**	**22**	**21**	**11**	**163**	**100**

***** General Elective – Extra credit is offered

HS – HUMANITIES AND SOCIAL SCIENCES
BS – BASIC SCIENCE
ES – ENGINEERING SCIENCES
PC – PROFESSIONAL CORE
PE – PROFESSIONAL ELECTIVES
MC – MANDATORY COURSES
AC – AUDIT COURSES
OE – OPEN ELECTIVES
CG – CAREER GUIDANCE COURSES

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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

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

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

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 006	Linear Algebra and Discrete Mathematics	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
5.	60 CP 0P2	Engineering Physics and Chemistry Laboratory	BS	4	0	0	4	2	NIL
6.	60 MA 014	Probability and Random Processes	BS	5	3	1	0	4	NIL
7.	60 MA 020	Inferential Statistics and Numerical Methods	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 AD 001	Foundations of Artificial Intelligence	ES	3	3	0	0	3	NIL
2.	60 ME 002	Engineering Graphics	ES	6	2	0	4	4	NIL
3.	60 CS 001	C Programming	ES	3	3	0	0	3	NIL
4.	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2	NIL
5.	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2	NIL
6.	60 EE 001	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3	NIL

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

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
2.	60 IT 0P1	Python Programming Laboratory	PC	4	0	0	4	2	Basic Knowledge of mathematics and programming
3.	60 CS 003	Data Structures	PC	3	3	0	0	3	Basic knowledge of mathematics and programming language in C
4.	60 CS 004	Java Programming	PC	3	3	0	0	3	Basic knowledge of any programming language with ability to solve logical problems
5.	60 AM 301	Formal Language and Automata Theory	PC	5	3	1	0	4	Basic Knowledge of mathematics and Computer Systems
6.	60 AM 302	Computer Architecture	PC	3	3	0	0	3	Basic knowledge of Software and Hardware
7.	60 CS 0P3	Data Structures Laboratory	PC	4	0	0	4	2	Basic knowledge of mathematics and programming language in C
8.	60 CS 0P4	Java Programming Laboratory	PC	4	0	0	4	2	Basic knowledge of any 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.	60 AM 401	Artificial Intelligence	PC	3	3	0	0	3	Basic knowledge of Computer programming and algorithms
11.	60 AM 402	Software Engineering	PC	4	2	0	2	3	NIL

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

S. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
12.	60 AM 403	Database Management Systems	PC	3	3	0	0	3	Basic Knowledge of Data Storage and Management
13.	60 AM 4P1	Artificial Intelligence Laboratory	PC	4	0	0	4	2	Basic Knowledge of Computer Programming and Algorithms
14.	60 AM 4P2	Database Management Systems Laboratory	PC	4	0	0	4	2	Basic Knowledge of Data Storage and Management
15.	60 AM 001	Machine Learning Techniques	PC	3	3	0	0	3	NIL
16.	60 AM 501	Network Infrastructure	PC	3	3	0	0	3	NIL
17.	60 AM 502	Operating System	PC	3	3	0	0	3	NIL
18.	60 IT 003	Design Thinking	PC	4	2	0	2	3	Basic Knowledge of Mathematics and Programming
19.	60 AM 0P1	Machine Learning Techniques Laboratory	PC	4	0	0	4	2	NIL
20.	60 AM 5P1	Network Infrastructure Laboratory	PC	4	0	0	4	2	NIL
21.	60 AM 601	Visual Analytics in AI	PC	3	3	0	0	3	NIL
22.	60 AM 602	Deep Learning	PC	3	3	0	0	3	Basic Knowledge of Machine Learning
23.	60 AM 603	Web Technology	PC	5	1	0	4	3	NIL
24.	60 AM 6P1	Visual Analytics in AI Laboratory	PC	4	0	0	4	2	NIL
25.	60 AM 6P2	Deep Learning Laboratory	PC	4	0	0	4	2	Basic knowledge of Machine Learning Concepts
26.	60 AM 701	Machine vision	PC	3	3	0	0	3	Basic Knowledge of Machine Learning and Visualization Techniques.
27.	60 AM 702	Speech and Language Processing	PC	3	3	0	0	3	Basic Knowledge of Deep Learning and ML Concepts.
28.	60 AM 703	Explainable AI	PC	3	3	0	0	3	NIL

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

S. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
29.	60 AM 7P1	Machine vision Laboratory	PC	4	0	0	4	2	Basic Knowledge of Machine Learning and Visualization Techniques.
30.	60 AM 7P2	Speech and Language Processing Laboratory	PC	4	0	0	4	2	NIL

PROFESSIONAL ELECTIVES

SEMESTER V, ELECTIVE I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 AM E11	Exploratory Data Analysis	PE	4	2	0	2	3	Basic Understanding of Statistics and Probability.
2.	60 AM E12	App Development	PE	4	2	0	2	3	Basic Knowledge of Java Programming.
3.	60 AM E13	Ethical Hacking	PE	4	2	0	2	3	Basic Knowledge of Network Protocols and Architectures.
4.	60 AM E14	Augmented Reality/Virtual Reality	PE	4	2	0	2	3	Basic Understanding of spatial Mathematics and Physics concepts.
5.	60 AM E15	Cyber Security	PE	4	2	0	2	3	Basic Knowledge of Network Security Protocols and Architectures.
6.	60 AM E16	Knowledge Engineering	PE	4	2	0	2	3	Basic Knowledge of Artificial Intelligence.

SEMESTER VI, ELECTIVE II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 AM E21	Recommender Systems	PE	4	2	0	2	3	Basic Knowledge of Machine Learning
2.	60 AM E22	Cloud Services Management	PE	4	2	0	2	3	Basic Understanding of IT Concepts.
3.	60 AM E23	Digital and Mobile Forensics	PE	4	2	0	2	3	Proficiency in Computer Systems and Mobile Operating

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

4.	60 AM E24	Multimedia and Animation	PE	4	2	0	2	3	Basic Knowledge of Design Principles and Visual Storytelling.
5.	60 AM E25	Quantum Computing	PE	4	2	0	2	3	Basic Understanding of Quantum Mechanics Principles.
6.	60 AM E26	Soft Computing	PE	4	2	0	2	3	Basic Knowledge of AI Concepts and basic Understanding of Calculus,Statistics.

SEMESTER VII, ELECTIVE III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 AM E31	Text and Speech Analysis	PE	3	3	0	0	3	Understanding of Linguistic Concepts, including Syntax and Semantics.
2.	60 AM E32	UI and UX Design	PE	3	3	0	0	3	Knowledge of Fundamental Design Concepts including color theory and layout Principles.
3.	60 AM E33	Social Network Security	PE	3	3	0	0	3	Understanding of Network Protocols and Security Measures.
4.	60 AM E34	Video Creation and Editing	PE	3	3	0	0	3	Proficiency in Video Editing Software.
5.	60 AM E35	Cryptocurrency and Blockchain Technologies	PE	3	3	0	0	3	Basic Understanding of Cryptographic Principles.
6.	60 AM E36	Game Theory	PE	3	3	0	0	3	Foundation in Probability and Statistics Concepts.

SEMESTER VII, ELECTIVE IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 AM E41	Business Analytics	PE	5	1	0	4	3	Proficiency in Python and SQL.

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

2.	60 AM E42	Web Application Security	PE	5	1	0	4	3	Basic Understanding of Web Technology.
3.	60 AM E43	Modern Cryptography	PE	5	1	0	4	3	Basic Understanding of Cryptographic Algorithms.
4.	60 AM E44	Digital marketing	PE	5	1	0	4	3	Understanding of basic Marketing Principles and Strategies.
5.	60 AM E45	Game Development	PE	5	1	0	4	3	Proficiency in Languages such as C# and Java.
6.	60 AM E46	Cognitive Science	PE	5	1	0	4	3	Basic Knowledge on Neural Networks.

SEMESTER VIII, ELECTIVE V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 AM E51	Image and Video Analytics	PE	3	3	0	0	3	Proficiency in Python Libraries such as OpenCV and Tensorflow.
2.	60 AM E52	DevOps	PE	3	3	0	0	3	Basic Knowledge of Linux Systems and Command-line Interface.
3.	60 AM E53	Engineering Secure software systems	PE	3	3	0	0	3	Basic Knowledge on Software Development life cycles.
4.	60 AM E54	Visual Effects	PE	3	3	0	0	3	Basic Knowledge of Design Principles and Visual Storytelling.
5.	60 AM E55	3D Printing and Design	PE	3	3	0	0	3	Basic Knowledge on 3D Printing Technologies.
6.	60 AM E56	Ethics and AI	PE	3	3	0	0	3	Proficiency in Python Libraries such as OpenCV and Tensorflow.

SEMESTER VII, 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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

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 & Writing in English

OPEN ELECTIVES I / II / III (OE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 AM L01	Exploratory Data Analysis	OE	3	3	0	0	3	Basic Understanding of Statistics and Probability.
2.	60 AM L02	AI for Energy Conservation and Management	OE	5	1	0	4	3	NIL
3.	60 AM L03	Intelligent AR/VR Systems	OE	5	1	0	4	3	Basic Understanding of spatial Mathematics concepts

LIST OF INTEGRATED COURSES (IC)

PROFESSIONAL ELECTIVE I									
S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 AM E11	Exploratory Data Analysis	PE	4	2	0	2	3	Basic Understanding of Statistics and Probability.
2.	60 AM E12	App Development	PE	4	2	0	2	3	Basic Knowledge of Java Programming.
3.	60 AM E13	Ethical Hacking	PE	4	2	0	2	3	Basic Knowledge of Network Protocols and Architectures.
4.	60 AM E14	Augmented Reality/Virtual Reality	PE	4	2	0	2	3	Basic Understanding of spatial Mathematics and Physics concepts.

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

5.	60 AM E15	Cyber Security	PE	4	2	0	2	3	Basic Knowledge of Network Security. Protocols and Architectures.
6.	60 AM E16	Knowledge Engineering	PE	4	2	0	2	3	Basic Knowledge of Artificial Intelligence.
PROFESSIONAL ELECTIVE II									
1.	60 AM E21	Recommender Systems	PE	4	2	0	2	3	Basic Knowledge of Machine Learning Concepts.
2.	60 AM E22	Cloud Services Management	PE	4	2	0	2	3	Basic Understanding of IT Concepts.
3.	60 AM E23	Digital and Mobile Forensics	PE	4	2	0	2	3	Proficiency in Computer Systems and Mobile Operating Systems.
4.	60 AM E24	Multimedia and Animation	PE	4	2	0	2	3	Basic Knowledge of Design Principles and Visual Storytelling.
5.	60 AM E25	Quantum Computing	PE	4	2	0	2	3	Basic Understanding of Quantum Mechanics Principles.
6.	60 AM E26	Soft Computing	PE	4	2	0	2	3	Basic Knowledge of AI Concepts and basic Understanding of Calculus,Statistics.

CAREER GUIDANCE COURSES (CG)

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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

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	Comprehensive Test	CG	2	0	0	2	1*	Fundamental Knowledge in all core
6.	60 CG 0P6	Internship *	CG	-	0	0	0	3*	NIL
7.	60 AM 7P3	Project Work – Phase I	CG	4	0	0	4	2	NIL
8.	60 AM 8P1	Project Work – Phase II	CG	16	0	0	16	8	NIL

* Internship – Extra credit is offered

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

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

(An Autonomous Institution affiliated to Anna University)

COURSES OF STUDY

(For the candidates admitted in 2022 – 2023)

SEMESTER I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
		Induction Programme	-	-	-	-	-	-
THEORY								
1	60 EN 001	Professional English-I	HS	3	1	0	2	2
2	60 MA 001	Matrices and Calculus	BS	5	3	1	0	4
3	60 AD 001	Foundations of Artificial Intelligence	ES	3	3	0	0	3
4	60 ME 002	Engineering Graphics	ES	6	2	0	4	4
5	60 CS 001	C Programming	ES	3	3	0	0	3
6	60 MY 001	Environmental Studies and Climate Change	MC	2	2	0	0	0
PRACTICALS								
7	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2
8	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2
			Total	**30**	**14**	**01**	**14**	**20**

- Heritage of Tamils & additional 1 credit is offered and not account for CGPA.

I to VII semester

- NCC * - Course can be waived with 3 credits in VII semester or offered as extra credits
- NSS/NSO/YRC/RRC/Fine Arts* 3 credits are not accounted for CGPA
- Career Skill Development (CSD) - additional credit is offered not accounted for CGPA.

I to VIII semester

- Internship 3 additional credits not accounted for CGPA is offered based on the Internship - duration in any of the semester.

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 006	Linear Algebra and Discrete Mathematics	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 EE 001	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3
6	60 IT 001	Python Programming	PC	5	3	1	0	4
7	60 GE 001	Heritage of Tamils தமிழர் மரபு*	GE	1	1	0	0	1*

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

PRACTICALS								
8	60 CP 0P2	Engineering Physics and Chemistry Laboratory	BS	4	0	0	4	2
9	60 IT 0P1	Python Programming Laboratory	PC	4	0	0	4	2
10	60 CG 0P1	Career Skill Development I	CG	2	0	0	2	1*
			Total	**33**	**17**	**02**	**12**	**23**

- Tamils and Technology * additional1 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 014	Probability and Random Processes	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	60 AM 301	Formal Language and Automata Theory	PC	5	3	1	0	4
5	60 AM 302	Computer Architecture	PC	3	3	0	0	3
6	60 MY 002	Universal Human Values*	MC	3	3	0	0	3*
7	60 GE 002	Tamils and Technology/	GE	1	1	0	0	1*
PRACTICALS								
8	60 CS 0P3	Data Structures Laboratory	PC	4	0	0	4	2
9	60 CS 0P4	Java Programming Laboratory	PC	4	0	0	4	2
10	60 CG 0P2	Career Skill Development II	CG	2	0	0	2	1*
11	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*
			Total	**33**	**19**	**02**	**10**	**21**

- UHV* 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 020	Inferential Statistics and Numerical Methods	BS	5	3	1	0	4
2	60 IT 002	Design and Analysis of Algorithms	PC	3	3	0	0	3
3	60 AM 401	Artificial Intelligence	PC	3	3	0	0	3
4	60 AM 402	Software Engineering	PC	4	2	0	2	3
5	60 AM 403	Database Management Systems	PC	3	3	0	0	3
6	60 OEL1*	Open Elective I	OE	3	3	0	0	3
7	60 MY 003	Startups and Entrepreneurship	MC	2	2	0	0	2*
PRACTICALS								
8	60 AM 4P1	Artificial Intelligence Laboratory	PC	4	0	0	4	2
9	60 AM 4P2	Database Management Systems Laboratory	PC	4	0	0	4	2
10	60 CG 0P3	Career Skill Development III	CG	2	0	0	2	1*
11	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*
			Total	**33**	**19**	**01**	**12**	**23**

*

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

SEMESTER V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1	60 AM 001	Machine Learning Techniques	PC	3	3	0	0	3
2	60 AM 501	Network Infrastructure	PC	3	3	0	0	3
3	60 AM 502	Operating System	PC	3	3	0	0	3
4	60 IT 003	Design Thinking	PC	4	2	0	2	3
5	60 AM E1*	Professional Elective I	PE	4	2	0	2	3
6	60 OEL2*	Open Elective II	OE	3	3	0	0	3
PRACTICALS								
7	60 AM 0P1	Machine Learning Techniques Laboratory	PC	4	0	0	4	2
8	60 AM 5P1	Network Infrastructure Laboratory	PC	4	0	0	4	2
9	60 CG 0P4	Career Skill Development IV	CG	2	0	0	2	1*
10	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*
			Total	**30**	**16**	**0**	**14**	**22**

SEMESTER VI

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 AM 601	Visual Analytics in AI	PC	3	3	0	0	3
3	60 AM 602	Deep Learning	PC	3	3	0	0	3
4	60 AM 603	Web Technology	PC	5	1	0	4	3
5	60 AM E2*	Professional Elective II	PE	4	2	0	2	3
6	60 OEL3*	Open Elective III	OE	3	3	0	0	3
PRACTICALS								
7	60 AM 6P1	Visual Analytics in AI Laboratory	PC	4	0	0	4	2
8	60 AM 6P2	Deep Learning Laboratory	PC	4	0	0	4	2
9	60 AM 6P3	Mini Project	PC	-	-	-	2	1[&]
10	60 CG 0P5	Comprehensive Test	CG	2	0	0	2	1*
11	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*
			Total	**31**	**15**	**0**	**18**	**22**

- Comprehension Test* - one additional credit is offered and not accounted for CGPA calculation.
- Mini-project[&] - 1 additional credit is offered and not accounted for CGPA calculation.

SEMESTER VII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1	60 AM 701	Machine vision	PC	3	3	0	0	3
2	60 AM 702	Speech and Language Processing	PC	3	3	0	0	3

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

3	60 AM 703	Explainable AI	PC	3	3	0	0	3
4	60 AM E3*	Professional Elective III	PE	3	3	0	0	3
5	60 AM E4*	Professional Elective IV	PE	5	1	0	4	3
6	60 AC 001	Research Skill Development	AC	1	1	0	0	0
7	60 AB 00*	NCC/NSS/NSO/YRC/RRC/Fine	-	4*	2*	0	2*	3*
PRACTICALS								
8	60 AM 7P1	Machine vision Laboratory	PC	4	0	0	4	2
9	60 AM 7P2	Speech and Language Processing Laboratory	PC	4	0	0	4	2
10	60 AM 7P3	Project Work - Phase I	CG	4	0	0	4	2
11	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3 *
			Total	**30**	**14**	**0**	**16**	**21**

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

SEMESTER VIII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1	60 AM E5*	Professional Elective V	PE	3	3	0	0	3
PRACTICALS								
2	60 AM 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: 163

Note:

HS - Humanities and Social Sciences including Management Courses, BS - Basic Science Courses, ES - Engineering Science Courses, PE - Professional Core Courses, PE - Professional Elective Courses, OE - Open Elective Courses, CG – Career Guidance Courses, AC - Audit Courses & MC - Mandatory Courses, IC – Integrated Courses

L: Lecture

T: Tutorial

P: Practical

1 Hour Lecture is equivalent to 1 credit

2 Hour Tutorial is equivalent to 1 credit

2 Hours Practical is equivalent to 1 credit

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

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 2022 - 2023)

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 AD 001	Foundations of Artificial Intelligence	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
PRACTICAL								
7	60 CS 0P1	C Programming Laboratory	3	60	40	100	45	100
8	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	3	60	40	100	45	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.

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

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	3	-
CO2	-	-	-	-	-	-	-	2	3	3	2	3	2	3	-
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	3	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	2	3	-
CO5	-	-	-	-	-	-	-	2	3	3	2	3	2	3	-
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to all Branches								
60 EN 001 - Professional English- I								
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]
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 non verbal (chart, graph etc, to verbal mode) **Language Focus:** Articles; Pronouns -Possessive & Relative pronouns; ; subject-verb agreement; collocations.	[9]
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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**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
1.5	Writing letters – informal	1
1.6	Writing letters – formal	1
1.7	Present Tenses	1
1.8	Synonyms, antonyms and contranyms, and affixes	1
1.9	Phrasal verbs; abbreviations & acronyms	1
2.0	**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	1
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
3.0	**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
4.0	**Classification and Recommendations**	
4.1	Listening to TED Talks and educational videos	1
4.2	Listening to scientific lectures	1
4.3	Small Talk and mini presentations	1
4.4	Reading newspaper articles and journal reports	1
4.5	Note-making / Note-taking	1
4.6	Recommendations	1
4.7	Transferring information from non-verbal	1
4.8	Articles and Pronouns	1
4.9	Subject-verb agreement and collocations	1
5.0	**Expression**	
5.1	Listening to debates and panel discussions	1
5.2	Group discussions	2

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

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
	Total	**45**

Course Designer(s)

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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

60 MA 001	Matrices and Calculus	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To familiarize the students with basic concepts in Cayley-Hamilton theorem and orthogonal transformation
- To get exposed to the fundamentals of differential calculus in various methods
- 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		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO5	3	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)
	1	2		
Remember	10	10	10	10
Understand	10	10	20	20
Apply	40	40	70	70
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to MECH, ECE, EEE, CSE, MCT, CIVIL, IT, TXT, BT, FT, AI&DS, AI&ML

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]
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* **Hands-on:** **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 **Hands-on:** **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 + 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",10th Edition, Laxmi Publications (P) Ltd, 2016.

*SDG 4 – Quality Education

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**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
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
2.0	**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
3.0	**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	2
3.5	Maxima and minima of functions of two variables	1
3.6	Lagrange's Method of Undetermined Multipliers	1
3.7	Tutorial	2
3.8	Hands-on	2
4.0	**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
4.3	Differential equations with variable coefficients: Cauchy's form of linear equations	2
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	1
4.7	Hands-on	2
5.0	**Integration**	
5.1	Definite and Indefinite integrals	2
5.2	Substitution rule	1
5.3	Techniques of Integration: Integration by parts	1
5.4	Integration of rational functions by partial fraction	1

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

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 Designer(s)

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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

60 AD 001	Foundations of Artificial Intelligence	Category	L	T	P	Credit
		ES	3	0	0	3

Objectives

- To understand the role of data in AI
- To gain knowledge on Machine Learning process
- To investigate applications of Deep Learning
- To enhance the knowledge in RPA and NLP
- To understand the different use cases of robots in AI

Pre-requisites

- NIL

Course Outcomes

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

CO1	Demonstrate fundamental understanding of Artificial Intelligence, Data and its types	Understand
CO2	Interpret the Machine Learning Process	Remember
CO3	Analyse the concept of Deep Learning	Analyse
CO4	Recognize the need of RPA in business process and analyse the process of NLP	Apply
CO5	Enumeration the functionalities and roles of Robot in AI	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	1	-	-	-	-	1	-	-	-	-	-	-	-
CO2	3	3	1	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	1	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	1	-	-	-
CO5	-	-	2	-	3	-	-	2	-	-	-	1	-	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	30	-	20	20
Understand	30	-	50	50
Apply	-	30	15	15
Analyse	-	30	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to AD and AIML								
60 AD 001 - Foundations of Artificial Intelligence								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

AI Foundations and Data* Turing Test, Cybernetics, Technological Drivers of Modern AI, Structure of AI, Data Basics, Types of Data, Database, Data Process, Data for AI, Ethics and Governance.	[9]
Machine Learning* Introduction, Machine Learning Process, Supervised Learning, Un Supervised Learning, Type of Machine Learning Algorithms.	[9]
Deep Learning** Introduction, Difference Between Deep Learning and Machine Learning, The Brain and Deep Learning, Back propagation, Deep Learning Applications.	[9]
RPA and NLP*** Introduction to RPA, Implementing RPA, RPA and AI, Introduction to NLP, Challenges of NLP, Understanding Language Translation, Voice Recognition.	[9]
Physical Robots*** Robot, Industrial and Commercial Robots, Robots in the Real World, Cybersecurity and Robots, Programming Robots for AI, Future of Robots.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Tom Taulli, “Artificial Intelligence Basics A Non-Technical Introduction”, Apress, 2019.
2.	Peter Norvig and Stuart J. Russell, “Artificial Intelligence: A Modern Approach”, Prentice Hall, 3rd Edition.
Reference(s):	
1.	K. R. Chowdhary, “Fundamentals of Artificial Intelligence”, Springer 2019
2.	David L. Poole, “Artificial Intelligence: Foundations of Computational Agents”, 2nd edition, Cambridge University Press 2017.
3.	Kevin Knight, Elaine Rich, B. Nair, “Artificial Intelligence”, The McGraw-Hill, 3rd Edition.
4.	M.C. Trivedi, “A classical approach to Artificial Intelligence”, Khanna Book Publishing Company Private Limited.

*SDG 4 – Quality Education

**SDG 8 – Decent Work and Economic Growth

***SDG 9 – Industry Innovation and Infrastructure

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**AI Foundations and Data**	
1.1	Turing Test	1
1.2	Cybernetics	1
1.3	Technological Drivers of Modern AI	1
1.4	Structure of AI	1
1.5	Data Basics	1
1.6	Types of Data	1
1.7	Database	1
1.8	Data Process, Data for AI	1
1.9	Ethics and Governance	1
2	**Machine Learning**	
2.1	Introduction	1
2.2	Machine Learning Process	2
2.3	Supervised Learning	2
2.4	Un Supervised Learning	2
2.5	Type of Machine Learning Algorithms	2
3	**Deep Learning**	
3.1	Introduction	1
3.2	Difference Between Deep Learning and Machine Learning	2
3.3	The Brain and Deep Learning	2
3.4	Back propagation	2
3.5	Deep Learning Applications	2
4	**RPA and NLP**	
4.1	Introduction to RPA	1
4.2	Implementing RPA	2
4.3	RPA and AI	2
4.4	Introduction to NLP	2
4.5	Challenges of NLP	1
4.6	Understanding Language Translation	1
4.7	Voice Recognition	
5	**Physical Robots**	
5.1	Robot	1
5.2	Industrial and Commercial Robots	1
5.3	Robots in the Real World	2
5.4	Cyber security and Robots	2
5.5	Programming Robots for AI	2
5.6	Future of Robots	1
	Total	**45**

Course Designer(s)

1.Mr. N. GIRIDHARAN - giridharan@ksrct.ac.in

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

60 ME 002	Engineering Graphics	Category	L	T	P	Credit
		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	-	-	-	-	-	-	-	-	-	3	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO3	3	3	3	-	3	-	-	3	-	-	-	-	3	3	-
CO4	3	3	3	-	3	-	-	3	-	-	-	-	3	3	-
CO5	3	3	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)
	1	2		
Remember	10	10	20	20
Understand	20	20	30	30
Apply	30	30	50	50
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to All

60 ME 002 – Engineering Graphics

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]
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. Agrawal B. & Agrawal C. M., “Engineering Graphics”, TMH Publication, 2012.
4. Narayana, K.L. & P Kannaiah, “Text book on Engineering Drawing”, Scitech Publishers, 2008.

*SDG 4 – Quality Education

** SDG 9 – Industry Innovation and Infrastructure

***SDG 11 – Sustainable Cities and Communities

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**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
2.0	**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
2.9	Practice class for pictorial views to orthographic views.	2
3.0	**Projection of Solids**	
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
4.0	**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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

5.0	**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
5.7	Introduction to Building Information Modelling (BIM).	2
	Total Hours	**90**

Course Designer(s)

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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

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	2	-
CO2	3	3	3	-	3	-	-	-	2	2	-	2	3	2	-
CO3	3	3	3	-	3	-	-	-	2	2	-	2	3	2	-
CO4	3	3	3	-	3	-	-	-	2	2	-	2	3	2	-
CO5	3	3	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)
	1	2		
Remember	10	10	20	20
Understand	10	10	20	20
Apply	40	40	60	60
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to all Branches								
60 CS 001 – C Programming								
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]
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.	E.Balagurusamy, “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.	K N King, “C Programming: A Modern Approach”, Second Edition, W.W.Norton, New York, 2008.

*SDG 4 – Quality Education

** SDG 9 – Industry Innovation and Infrastructure

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**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
2.0	**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
2.5	String Manipulation with String Handling Functions	2
3.0	**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
4.0	**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
5.0	**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
	Total Hours	**45**

Course Designer(s)

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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

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 Analyse 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

- 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.	Analyse
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	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	-	-	-	-	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)		Quiz (20 Marks)		Seminar Presentation (50 marks)
	Case Study	Activity Report	Quiz 1	Quiz 2	
Remember	10	10	05	05	10
Understand	30	20	10	10	15
Apply	-	30	-	05	15
Analyse	20	-	05	-	10
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	60	60	20	20	50

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to all Branches								
60 MY 001 - Environmental Studies and Climate Change								
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 and Classification. Principles of Waste Management (5R approach) - Swachh Bharat Abhiyan – Commercial Waste, Plastic Waste, Domestic Waste, e-Waste - 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 , C P Kaushik. 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.
2.	Gilbert M.Masters and Wendell P. Ela,"Environmental Engineering And Science", PHI Learning PrivateLimited, 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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

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	1
2.2	Commercial Waste, Plastic Waste, Domestic Waste, E-waste and Biomedical Waste	1
2.3	Risk Management: Collection, Segregation, Treatment and Disposal Methods.	1
2.4	Waste Water Treatment - Activate Sludge Process	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	1
4.3	Roof Gardening and Irrigation	2
4.4	Waste Land Reclamation. Climate Resilient Agriculture, Green Auditing	2
5.0	**Geo-science in Natural Resource Management**	
5.1	Database Software in Environment Information, Digital Image Processing Applications in Forecasting	2
5.2	GPS, Remote Sensing and Geographical Information System (GIS)	2
5.3	World Wide Web(www), Environmental Information system (ENVIS)	2
	Total Hours	**30**

Course Designer(s)

1. Dr.T.A. SUKANTHA – sukantha@ksrct.ac.in
2. Dr.K. PRABHA – prabhak@ksrct.ac.in
3. Dr.S.MEENACHI – meenachi@ksrct.ac.in

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

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		
	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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022

BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to All								
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

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*.

Lab Manual	
1.	"C Programming Lab Manual", Department of CSE(Artificial Intelligence and Machine Learning), KSRCT.

*SDG 4 – Quality Education

Course Designer(s)

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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

60 ME 0P1	Fabrication and Reverse Engineering Laboratory	Category	L	T	P	Credit
		ES	0	0	4	2

Objectives

- To acquire skills in operating hand tools and instruments.
- To provide hands-on training on Carpentry, Sheet metal, Fitting and Welding.
- To provide hands-on training on household wiring and electronic circuits
- To offer real time activity on plumbing connections in domestic applications.
- To provide hands-on activities on dismantling, and assembling the Home Appliance, Center lathe operations, computer's internal components and peripherals.

Pre-requisites

NIL

Course Outcomes

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

CO1	Perform power tools operations.	Apply
CO2	Make a wooden model using carpentry Process	Apply
CO3	Make a model using sheet metal, filing and joining a MS Plate	Apply
CO4	Repair and Maintenances of water lines for home applications	Apply
CO5	Trouble shoots the electrical and electronic circuits, Electrical machines and realizes the reputation of house wiring, home Appliance, computer internal components and peripherals.	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	-
CO2	3	2	3	-	-	2	2	-	3	-	-	3	-	3	-
CO3	3	2	3	-	-	2	2	-	3	-	-	3	-	3	-
CO4	3	2	3	-	-	2	2	-	3	-	-	3	-	3	-
CO5	3	2	3	-	-	2	2	-	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

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

Syllabus

Performs of Power Tools*
Drilling in different Walls and Materials Fitting of Hand shower mount, Shirt hanger, Towel hanger and Pipe with clamps.

Carpentry Process*
Design and Development of Wooden Model using the Carpentry Process T / Cross Joint / different joints

Sheet Metal and Filling Process*
Design and Development of Metal Model - Make a Tray Components using Sheet Metal Process and Mating of Square joint in MS Plate using the Filling Process

Welding Process*
Fabrication of Models with MS Plate using Arc Welding- Lap Joint, Butt Joint, T Joint

Plumbing Process*
Repair and Maintenances of Pipe Fitting for Home Applications Study of plumbing tools, assembly of G.I. pipes/ PVC and pipe fittings, cutting of threads in G.I. Pipes by thread cutting dies.

Residential house wiring*
Design and Excusion of Residential house wiring with and Without UPS- 1 BHK - 2 BHK. Design and fabrication of domestic LED lamps - Circuit designing (calculation of components)

Electronic Circuit wiring*
PCB fabrication – Soldering - Assembling of Audio Amplifiers- Connecting USB/Bluetooth MP3 player board - Connecting Volume controllers - Connecting bass & treble filter boards - Connecting Surround and sub-woofer filter board

Assembling and dismantling of Electronics Machines*
Iron box, Induction stove, Water heater, Mixer, Table fan, Ceiling fan

Study Exercises
Demonstration of Centre Lathe Operations Facing, Turning, and drilling and its components.
Assemble and dismantle of Vacuum Cleaner / Refrigerator and its components

Computer Hardware Study Exercises
Identify internal components of computer - Assemble and dismantle desktop computer systems

*SDG 9 – Industry Innovation and Infrastructure

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

List of Experiments:

1. Fitting of Wall mounting Parts using Power Tools

a) Drilling in different Walls and Materials

b) Fitting of Hand shower mount, Shirt hanger, Towel hanger and Pipe with Clamps.

2. Making of Wooden model using the Carpentry Process

a) T / Cross Joint

b) Mortise and Tenon Joint / different joints

3. Making of Metal Model

a) Making of Components using Sheet Metal Process

b) Mating of Components using the Filling Process

4. Fabrication of Welded model

5. Repair and Maintenance of Pipe Fitting for Home Applications

a) Assembly of GI pipes/PVC and Pipe Fitting

b) Cutting of Threads in GI pipes by thread Cutting Dies

6. Assembling and dismantling of

a) Iron box

b) Induction stove

c) Water heater

d) Mixer

e) Table fan

f) Ceiling fan

7. Design and Execution of Residential house wiring

a) 1 BHK

b) 2 BHK

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) Circuit designing (calculation of components)

b) PCB fabrication

c) Soldering

10. Assembling of Audio Amplifiers

a) Connecting USB/Bluetooth MP3 player board

b) Connecting Volume controllers

c) Connecting bass & treble filter boards

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

d) Connecting Surround and sub-woofer filter board	
Study Exercises	
1. Demonstration of Centre Lathe and its operations like Facing, Turning, and drilling.	
2. Dismantle and Assemble of Vacuum Cleaner / Refrigerator.	
3. Study of components of computer. Dismantle and assemble of desktop computer systems	
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. D Sri Vidya - srividhya@ksrct.ac.in
3. Mr. K. Raguvaran – raguvaran@ksrct.ac.in

Passed in BoS Meeting held on 19/07/2022

Approved in Academic Council Meeting held on 23/07/2022 BoS Chairman Signature

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 2022 – 2023)
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 Semester Exam	Total
THEORY								
1	60 EN 002	Professional English-II	2	40	60	100	45	100
2	60 MA 006	Linear Algebra and Discrete Mathematics	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 EE 001	Basic Electrical and Electronics Engineering	2	40	60	100	45	100
6	60 IT 001	Python Programming	2	40	60	100	45	100
7	60 GE 001	Heritage of Tamils தமிழர் மரபு*s	1	100	-	100	-	100
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	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.

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

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 & 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
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	3	3	-
CO2	-	-	-	-	-	-	-	2	3	3	2	3	2	3	-
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	3	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	3	3	-
CO5	-	-	-	-	-	-	-	2	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)
	1	2		
Remember	10	10	20	20
Understand	50	50	80	80
Apply	-	-	-	-
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to All Branches

60 EN 002 - Professional English II

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	1	0	2	45	2	40	60	100

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):

1.	Raman, Meenakshi, Sharma, Sangeeta, "Professional English", Oxford university press, New

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

	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.	V.N. Arora and Laxmi Chandra, “Improve Your Writing”, Oxford University Press, New Delhi, 2001.

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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 organizer	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
2.0	**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
3.0	**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
4.0	**Reporting of Events and Research**	
4.1	Listening Comprehension	1
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, Summarising and Plagiarism	1
4.8	Reported Speech, Modals	1
4.9	Conjunctions	1
5.0	**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
	Total	**45**

Course Designer(s)

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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

60 MA 006	Linear Algebra and Discrete Mathematics	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To gain basic knowledge about linear algebra
- To facilitate different techniques in solving system of vectors
- To perform different operations associated with sets, functions, and relations
- To get exposed to basics of Mathematical logic
- To familiarize the machine intelligence problems based on principle of counting

Pre-requisites

NIL

Course Outcomes

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

CO1	Interpret the linear algebra concepts in approximations and matrix decompositions.	Apply
CO2	Apply the concepts of basis and dimension in vector spaces.	Apply
CO3	Apply the concepts of relations, functions, and operations on sets.	Apply
CO4	Employ logic principles to evaluate the reliability of a programme.	Apply
CO5	Interpret the counting principles in implementing various programmes.	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	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO5	3	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)
	1	2		
Remember	10	10	10	10
Understand	10	10	20	20
Apply	40	40	70	70
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 MA 006 – Linear Algebra and Discrete Mathematics

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

Linear Algebra Linear Equations in Linear Algebra: **System of Linear Equations*** –Row reduction and Echelon forms–Vector equations– Matrix Equation Ax = b –Linear independence– **Introduction to linear transformation*– Matrix of a linear transformation**** – Geometric linear transformations of R^2 –Transformation from R^n to R^m –Linear models in network flow. **Hands – on:** Calculate the reduced row echelon form	[9]
Vector Spaces** Vector spaces - Subspaces – Null spaces – Row and column spaces – Linear independent sets, basis and dimension of vector spaces – Rank – Change of basis – Applications to difference equations and Markov chains. **Hands – on:** Find the basis of null space, column space, row space associated with a matrix.	[9]
Set Theory*, ** Sets – Set Operations – Relations and Their Properties– Representing Relations– Equivalence relations –Functions. **Hands – on:** Various functions for set operations, like union, intersection etc	[9]
Mathematical Logic*, ** Propositional logic – Propositional equivalences – Predicates and quantifiers – Rules of inference. **Hands – on:** Functions for logical operations	[9]
Combinatorics*, ** Permutations and Combinations - Pigeonhole Principle-Mathematical induction – Recurrence relations–Generating functions. **Hands – on:** Find the permutation and combination of the values	[9]
Total Hours: 45 + 15(Tutorial)	**60**

Text Book(s):

1. DavidC.Lay, Steven R. Lay, Judith McDonald"Linear Algebra and its Applications", 6th Edition, Harlow: Pearson Education Ltd.2022.
2. J. P. Tremblay and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 49th Reprint, McGraw–Hill Education Private Limited, New Delhi, 2016.

Reference(s):

1. GilbertStrang, Introduction to linearalgebra,5th Edition, ANEBooks,2016.
2. K. H. Rosen, "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Publishing Company Ltd.,New Delhi, 2011.
3. T. Veerarajan," Discrete Mathematics with Graph Theory and combinatorics", 5th Reprint, Tata McGrawHill Publishing Company Ltd., 2008.
4. C. L. Liu, "Elements of Discrete Mathematics", 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2017.
5. Prof. Sudarshan Iyengar, Prof. Neeldhara, "Discrete Mathematics" – NPTEL online video course

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Linear Algebra**	
1.1	Linear Equations in Linear Algebra: System of Linear Equations	1
1.2	Row reduction and Echelon forms	2
1.3	Vector equations – Matrix Equation Ax = b	1
1.4	Linear independence	1
1.5	Introduction to linear transformation	1
1.6	Matrix of a linear transformation	1
1.7	Geometric linear transformations of R^2 – Transformation from R^n to R^m	1
1.8	Linear models in network flow	1
1.9	Tutorial	2
1.10	Hands On	1
2.0	**Vector Spaces**	
2.1	Vector spaces and subspaces	1
2.2	Null spaces	1
2.3	Row and column spaces	2
2.4	Linear independent sets of vector spaces	1
2.5	basis and dimension of vector spaces	1
2.6	Rank	1
2.7	Change of basis	1
2.8	Applications to difference equations and Markov chains	1
2.9	Tutorial	2
2.10	Hands On	1
3.0	**Set Theory**	
3.1	Sets	1
3.2	Set Operations	1
3.3	Relations and Their Properties	2
3.4	Representing Relations	1
3.5	Equivalence relations	2
3.6	Functions	2
3.7	Tutorial	2
3.8	Hands On	1
4.0	**Mathematical Logic**	
4.1	Propositional logic	2
4.2	Propositional equivalences	2
4.3	Predicates and quantifiers	2
4.4	Rules of inference	3
4.5	Tutorial	2
4.6	Hands On	1
5.0	**Combinatorics**	
5.1	Permutations	1
5.2	Combinations	1
5.3	Pigeonhole Principle	1
5.4	Mathematical induction	2
5.5	Recurrence relations	2
5.6	Generating functions	2
5.7	Tutorial	2
5.8	Hands On	1
	Total	**60**

Course Designer(s)

1. Dr.D.TAMIZHARASAN -tamizharasan@ksrct.ac.in

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

60 PH 004	Physics for Computer Technology (B.E/B.Tech. CSE, IT, AI&DS , AI&ML)	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
- To enable the students to correlate the theoretical principles with application oriented studies in optoelectronic 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	Understand
CO2	Apply the principles of LCD, photo detectors and optoelectronic devices for various engineeringapplications	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)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	20	20	34	34
Understand	40	40	66	66
Apply	-	-	-	-
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 PH 004 - Physics for Computer Technology

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 odulation.	[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.	M. N. Avadhanulu, P. G. Kshirsagar, TVS Arun Murthy "A Text Book of Engineering Physics", S Chand Publications, New Delhi, 2022.
2.	H. K. Malik, A. K. Singh "Engineering Physics" McGraw Hill Education Private Limited, New Delhi, 2018.
3.	D. R. Joshi "Engineering Physics" McGraw Hill Education Private Limited, New Delhi. 2010
Reference(s):	
1.	S.O. Pillai "A Text book Of Engineering Physics" New Age International (P) Limited, New Delhi, 2014
2.	B.B. Laud "Lasers and Non-Linear Optics "New Age International Publications, New Delhi,2015
3.	Palanisamy, P.K., "Physics of Materials", Scitech Publications, Chennai. 2012

*SDG 4 – Quality Education

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Course Contents And Lecture Schedule

S. No.	Topics	No. Of Hours
1	**Semiconducting Materials**	
1.1	Intrinsic Semiconductors	1
1.2	Energy band diagram - direct and indirect band gap semiconductors	1
1.3	Carrier concentration inintrinsic 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
1.7	Carrier transport in Semiconductor drift, mobility and diffusion	1
1.8	Hall effect and devices	1
1.9	Ohmic contacts –Schottky diode	1
2	**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	**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
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	**Magnetic Materials and Devices**	
4.1	Origin of magnetic moment	1
4.2	Bohr magneton - Classification of magneticmaterials	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	**Nanotechnology and Quantum Computing**	
5.1	Introduction	1
5.2	Preparation of Nano materials	1

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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
2. Mr.S. Vanchinathan - vanchinathan@ksrct.ac.in
3. Dr. P. Suthanthira Kumar - suthanthirakumar@ksrct.ac.in

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

60 CH 004	Engineering Chemistry (Common to CSE, IT & AIML)	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
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	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	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)
	1	2		
Remember	20	20	20	20
Understand	30	40	60	60
Apply	10	-	20	20
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Common to CSE, IT & AIML

60 CH 004 - Engineering Chemistry

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.	[9]
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.	[9]
Smart Materials** Liquid Crystal Polymers - Organic Light Emitting Diode - Polythiopene - Working and Applications - Conductive Polymers and Semi Conducting Polymers - Principle and Applications - 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 - SMILEY 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.	O.G. Palanna “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
3.	O.V. Roussak and H.D. Gesser, 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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Course Contents And Lecture Schedule

S. No.	Topics	No. of Hours
1	**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	**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	**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
3.9	Separation Methods. Nano technology in chemical sensors.	1
4	**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 Applications	1
5	**Cheminformatics**	
5.1	Definition – coordinate –bonds –bond length – bond angles – torsional angles	2

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

	– chemical structure –	
5.2	Definition - conformation – representation of structural information	2
5.3	Linear format – SMILEYF 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
2. Dr.B. SRIVIDHYA – srividhyab@ksrct.ac.in
3. Dr.S. MEENACHI – meenachi@ksrct.ac.in
4. Ms.D. KIRTHIGA – kiruthiga@ksrct.ac.in

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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

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.	Apply
CO3	Express the significance of various components of low voltage electrical installations and create awareness on electrical safety.	Understand
CO4	Demonstrate the operation and characteristics of various semiconductor devices.	Apply
CO5	Interpret 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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	2	-	-	-	-	2	2	-	-
CO3	3	2	-	-	-	2	-	-	-	-	-	2	2	-	-
CO4	2	2	-	-	-	-	2	-	-	2	-	2	2	-	-
CO5	2	2	-	-	-	-	3	-	3	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)
	1	2		
Remember	20	20	20	20
Understand	20	40	40	40
Apply	20	-	40	40
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to CSE, IT, AIDS, AIML, MECH, MCT, BT, FT and CIVIL Branches								
60 EE 001 – Basic Electrical and Electronics Engineering								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	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.	[9]
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.	[9]
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.	[9]
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**.**	[9]
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.
	H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

*SDG 4 – Quality Education

** SDG9 – Industry, Innovation and Infrastructure

***SDG7 – Affordable and Clean Energy

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

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	1
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, Types and Applications	1
2.6	Construction, Working Principle and Applications of Transformer	1
2.7	Construction, Working Principle and Applications of Three Phase Alternator	1
2.8	Construction, Working Principle and Applications of Synchronous Motor	1
2.9	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
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	2
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
5.8	DSO, Block Diagram, Data Acquisition	2

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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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

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	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	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	10	10	10	10
Understand	20	10	20	20
Apply	30	40	70	70
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to CS, IT, AD,AIML								
60 IT 001 – Python Programming								
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+15(Tutorial)	60

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

** SDG 9 – Industry Innovation and Infrastructure

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**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
2.0	**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
3.0	**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
3.9	User Defined Exceptions	1
4.0	**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
5.0	**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
	Total	**45**

Course Designer(s)

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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

60 GE 001	Heritage of Tamils	Category	L	T	P	Credit
		GE	1	0	0	1*

Object-ives

- 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
CO5	Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine.	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	-	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	Model Examination (Marks)	End Semester Examination (Marks)
Remember	40	-
Understand	60	-
Apply	-	-
Analysis	-	-
Evaluate	-	-
Create	-	-

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

60 GE 001 – Heritage of Tamils (Common to all Departments)

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	1	0	0	15	1*	100	-	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 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, Self-confidence, Goals, Relationships, Leadership, Gender equality.	[3]
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 instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.	[3]
Folk and Martial Arts* Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.	[3]
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 Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.	[3]
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 India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.	[3]
Total Hours	**15**

Text Book(s):

1.	முனைவர் கே. கே. பிள்ளை, தமிழக வரலாறு - மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 18th Ed ,2022.
2.	முனைவர் இல. சுந்தரம், கணினித்தமிழ்,விகடன் பிரசுரம், 2nd Ed 2021
3.	முனைவர் இரா.சிவானந்தம், மு.சேரன், கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, 6th Ed ,2020.
4.	முனைவர் இரா.சிவானந்தம் , முனைவர் ஜெ.பாஸ்கர், பொருநை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு,1st Ed ,2022
5.	ஈரோடு கதிர், உயர்தல் உரிமை, சிக்ஸ் ப்ளஸ் ட்ரெயினிங் அகாடமி,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,

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

	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.
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 ,3rd Ed, 2022

*SDG 4 – Quality Education

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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

60 GE 001	தமிழர் மரபு	Category	L	T	P	Credit
		GE	1	0	0	1*

பாடத்தின் நோக்கங்கள்:

- தமிழ் மொழியின் இலக்கணச் செறிவைக் கற்றுணர்தல்
- தமிழர் பண்பாட்டின் நுண்கலைகள் பற்றிய ஒரு மீள்பார்வை
- இந்திய சுதந்திரப் போராட்டத்தில் தமிழர்களின் பங்களிப்பை உணருதல்

முன்கூட்டிய துறைசார் அறிவு:

தேவை இல்லை

பாடம் கற்றதின் விளைவுகள்:

பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

CO1	தமிழ் மொழியின் செந்தண்மை மற்றும் இலக்கியம் குறித்த தெரிதல்.	புரிதல்
CO2	தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக்கருவிகள் குறித்த தெளிவு.	புரிதல்
CO3	தமிழர்களின் நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு.	புரிதல்
CO4	தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள்.	புரிதல்
CO5	இந்திய தேசிய இயக்கம், சுயமரியாதையை இயக்கம் மற்றும் சித்த மருத்துவம் பற்றிய புரிதல்.	புரிதல்

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	Model Examination (Marks)	End Semester Examination (Marks)
Remember	40	-
Understand	60	-
Apply	-	-
Analysis	-	-
Evaluate	-	-
Create	-	-

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
60 GE 001- தமிழர் மரபு (அனைத்து துறைகளும் பொதுவானது)								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	1	0	0	15	1*	100	-	100

மொழி மற்றும் இலக்கியம்: * இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ் காப்பியங்கள் - தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு. வாழ்வியல், பொறுப்புணர்வு, சுய ஆய்வு, மனோபாவம், தன்னம்பிக்கை, இலக்குகள், உறவுகள், தலைமைப்பண்பு, பாலின சமநிலை.	[3]
மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை- சிற்பக் கலை. * நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.	[3]
நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுள்: * தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து சிலம்பாட்டம், வளரி, புளியாட்டம், தமிழர்களின் விளையாட்டுகள் .	[3]
தமிழர்களின் திணைக் கோட்பாடுகள்: * தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி .	[3]
இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: * இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ் புத்தகங்களின் அச்சு வரலாறு	[3]
Total Hours	**15**

Text Book(s):

1.	முனைவர் கே. கே. பிள்ளை, தமிழக வரலாறு - மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 18th Ed ,2022.
2.	முனைவர் இல. சுந்தரம், கணினித்தமிழ்,விகடன் பிரசுரம், 2nd Ed,2021
3.	முனைவர் இரா.சிவானந்தம், மு.சேரன், கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, 6th Ed,2020.
4.	முனைவர் இரா.சிவானந்தம் , முனைவர் ஜெ.பாஸ்கர், பொருநை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு,1st Ed ,2022
5.	ஈரோடு கதிர், உயர்தல் உரிமை, சிக்ஸ் ப்ளஸ் ஒன் ட்ரெயினிங் அகாடமி,1st ,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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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

Course Designer(s)

1. Dr.A.M.Venkatachalam – amvenku@ksrct.ac.in

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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 Analyse 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	Analyse the properties of semiconducting materials for its potential applications	Apply
CO2	Realize the interference and diffraction phenomena by Airwedge 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 Analyse instrumental techniques for chemical analysis	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	-	-	-	-	-	-
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	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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to CSE, IT, AIML, EEE, ECE, VLSI								
60 CP 0P2 - Engineering Physics and Chemistry Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	0	0	4	60	2	60	40	100

PHYSICS LABORATORY

List of Experiments:

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. *

CHEMISTRY LABORATORY

List of Experiments:

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. ***

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.

*SDG: 4 - Quality Education
**SDG 6 - Improve Clean Water and Sanitation
***SDG 9 - Industry, Innovation, and Infrastructure
***SDG 8 - Decent Work and Economic Growth y

Course Designer(s) – Physics

1. Dr. V. Vasudevan - vasudevanv@ksrct.ac.in
2. Mr.S. Vanchinathan - vanchinathan@ksrct.ac.in
3. Dr. P. Suthanthirakumar - suthanthirakumar@ksrct.ac.in

Course Designer(s) – Chemistry

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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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

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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

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

List of Experiments:

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

Lab Manual	
1.	"Python Programming Lab Manual", Department of Information & Technology, KSRCT.

*SDG 9 – Industry Innovation and Infrastructure
**SDG 3 – Good Health and Well Being
***SDG 7 – Affordable and Clean Energy

Course Designer(s)

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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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 technicaltexts	Analyse
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	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	3	2	3	-	-	-
CO2	-	-	-	-	-	-	-	2	3	3	2	3	-	2	-
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	-	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	-	2	-
CO5	-	-	-	-	-	-	-	2	3	3	2	3	2	2	-
3 - Strong; 2 - Medium; 1 - Some															

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

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

**SDG 8 – Decent Work and Economic Growth

***SDG 17 – Partnerships for the goals

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Listening**	
1.1	Listening for general information and Specific details	1
1.2	Listening to podcasts, documentaries and interviews with celebrities	1
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	2
2.0	**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.	1
2.5	Group discussions	2
3.0	**Reading**	
3.1	Loud reading vs Silent reading, Skimming & Scanning of passages	1
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	2
4.0	**Writing**	
4.1	Writing letters – informal and formal	1
4.2	Paragraph Texting	1
4.3	Definitions and instructions	1
4.4	Note-making / Note-taking	1
4.5	Essay texting	2
5.0	**Verbal Ability**	
5.1	Reading Comprehension (MCQs) and Cloze Test	1
5.2	Sequencing of sentences	1
5.3	Paraphrasing and Summarizing	1
5.4	Error Detection and Spelling Test	1
5.5	Prepositions	2
	Total	**30**

Course Designer(s)

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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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 2022 – 2023)

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 014	Probability and Random Processes	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 AM 301	Formal Language and Automata Theory	2	40	60	100	45	100
5	60 AM 302	Computer Architecture	2	40	60	100	45	100
6	60 MY 002	Universal Human Values*	2	100	-	100	-	100
7	60 GE 002	Tamil's and Technology / தமிழரும் தொழில்நுட்பமும்	1	100	-	100	-	100
PRACTICAL								
8	60 CS 0P3	Data Structures Laboratory	3	60	40	100	45	100
9	60 CS 0P4	Java Programming Laboratory	3	60	40	100	45	100
10	60 CG 0P2	Career Skill Development II	1	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 Practica End Semester Examination.

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

60 MA 014	Probability and Random Processes	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To learn the basic concepts of probability and random variables
- To impart knowledge on standard distributions
- To familiarize various methods in hypothesis testing
- To get exposed to the fundamentals of analysis of variance
- To learn fundamentals of random processes

Pre-requisites

- NIL

Course Outcomes

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

CO1	Characterize probability models and function of random variables.	Apply
CO2	Apply suitable probability distributions to solve simple practical problems.	Apply
CO3	Apply Student's t test, F test and Chi-square test for testing the statistical hypothesis.	Apply
CO4	Apply ANOVA techniques to test the equality of means for more than two populations.	Apply
CO5	Identify the random processes and compute their averages.	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	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO5	3	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)
	1	2		
Remember	10	10	10	10
Understand	10	10	20	20
Apply	40	40	70	70
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E –CSE(Artificial Intelligence and Machine Learning)

60 MA 014 - Probability and Random Processes

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

Probability and Random Variables Axioms of probability - Conditional probability - **Baye's theorem*** - Random variable - Probability mass function - Probability density function - Expectation - Moment generating function. **Hands - on:** Evaluate the probability density function for the sample data.	[9]
Standard Distributions **Discrete Distributions***: Binomial distribution - Poisson distribution - Geometric distribution. Continuous Distributions: Uniform distribution - Exponential distribution - Normal distribution. **Hands - on:** Estimate probability distribution parameters from sample data.	[9]
Testing of Hypothesis* Type I and Type II errors - Test of significance of small samples - Student's 't' test - Single mean - Difference of means - F-test - Chi-square test - Goodness of fit - Independence of attributes. **Hands - on:** Use two-sample F-test to test if the variances of two populations are equal.	[9]
Design of Experiments Analysis of variance: One-way classification - Completely randomized design - **Two-way classification*** - Randomized block design - Latin square design. **Hands - on:** Determine whether data from several groups of a factor have a common mean by using one-way ANOVA.	[9]
Random Processes Classification of random processes - First order and second order process - Strictly sense stationary process - Wide-sense stationary process - Autocorrelation function and its properties - Markov process - Markov chain. **Hands - on:** Compute autocorrelation function for a given series.	[9]
Total Hours: 45 +5(Hands on) +10 (Tutorial)	**60**

Text Book(s):

1. Gupta S. P., "Statistical Methods", 46th Revised Edition, Sultan Chand & Sons, New Delhi, 2021.
2. Ibe O. C., "Fundamentals of Applied Probability and Random Processes", 2nd Edition, Academic Press Inc, 2014.

Reference(s):

1. Ross S., "A First Course in Probability", 9th Edition, Pearson Education India, New Delhi, 2014.
2. Richard A Johnson, "Miller & Freund's Probability and Statistics for Engineers", 9th Edition, Pearson Education India, New Delhi, 2016.
3. Michael Mitzenmacher and Eli Upfal, "Probability and Computing: Randomization and Probabilistic Techniques in Algorithms and Data Analysis", 2nd Edition, Cambridge University Press, 2017.
4. Peyton Z Peebles Jr, "Probability, Random Variables and Random Signal Principles", 4th Edition, McGraw Hill Education, New Delhi, 2017.
5. Veerarajan T., "Probability, Statistics and Random Processes with Queueing Theory and Queueing Networks", 4th Edition, McGraw Hill Education, New Delhi, 2014.

*SDG 4 – Quality Education

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Probability and Random Variables**	
1.1	Axiomatic probability – Conditional probability	1
1.2	Baye's theorem	2
1.3	Random variable	1
1.4	Probability mass function	1
1.5	Probability density function	2
1.6	Expectation	1
1.7	Moment generating function	1
1.8	Tutorial	2
1.9	Hands on	1
2.0	**Standard Distributions**	
2.1	Discrete Distributions: Binomial distribution	1
2.2	Poisson distribution	2
2.3	Geometric distribution	1
2.4	Continuous Distributions: Uniform distribution	1
2.5	Exponential distribution	2
2.6	Normal distribution	2
2.7	Tutorial	2
2.8	Hands on	1
3.0	**Testing of Hypothesis**	
3.1	Type I and Type II errors	1
3.2	Test of significance of small samples	1
3.3	Student's 't' test	2
3.4	Single mean	1
3.5	F- test	2
3.6	Chi-square test for goodness of fit and independence of attributes	2
3.7	Tutorial	2
3.8	Hands on	1
4.0	**Design of Experiments**	
4.1	Analysis of variance	1
4.2	One-way classification	2
4.3	Completely Randomized Design	1
4.4	Two-way classification	2
4.5	Randomized Block Design	1
4.6	Latin square design	2
4.7	Tutorial	2
4.8	Hands on	1
5.0	**Random Processes**	
5.1	Classification of random processes	1
5.2	First order and second order process	1
5.3	Strict sense stationary process	1
5.4	Wide-sense stationary process	2
5.5	Autocorrelation function and its properties	1
5.6	Markov process	2
5.7	Markov chain	1
5.8	Tutorial	2
5.9	Hands on	1
	Total	**60**

Course Designer(s)

1. Dr.D.TAMIZHARASAN - tamizharasan@ksrct.ac.in

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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 data types 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 applications

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	Apply trees concepts and its applications.	Apply
CO3	Apply algorithm for solving problems like Sorting and Searching.	Apply
CO4	Apply the Priority Queue operations and Hashing techniques.	Apply
CO5	Apply Shortest Path and Minimum Spanning Tree algorithms and Biconnectivity.	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	-	-	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)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	10	10	20	20
Understand	20	10	20	20
Apply	30	40	60	60
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 CS 003 – Data Structures								
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.	[9]
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.	[9]
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-Heap.	[9]
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.	M.A.Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education Asia, 2008.
2.	Y.Langsam, M.J.Augenstein and A.M.Tenenbaum, "Data Structures using C", Pearson Education Asia, 2009.
Reference(s):	
1.	Rajesh K.Sukla,"Data Structure using C & C++", Wiley India, 2012.
2.	A.Tannenbaum, "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.

**SDG 9 – Industry Innovation and Infrastructure

*SDG 4 – Quality Education

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Lists, Stacks and Queues**	
1.1	Abstract Data Type (ADT)	2
1.2	The List ADT	2
1.3	The Stack ADT	3
1.4	The Queue ADT	2
2.0	**Trees**	
2.1	Preliminaries	1
2.2	Binary Trees	2
2.3	The Search Tree ADT	1
2.4	Binary Search Trees	1
2.5	AVL Trees	1
2.6	B –Trees	1
2.7	B + Trees	2
3.0	**Sorting and Searching**	
3.1	Preliminaries	1
3.2	Insertion Sort	1
3.3	Shell Sort,	1
3.4	Heap Sort, Merge Sort	1
3.5	Quick Sort	1
3.6	External Sorting, Searching	1
3.7	Sequential Search	1
3.8	Binary Search	1
3.9	Hashed List Searches	1
4.0	**Hashing and Priority Queues(Heaps)**	
4.1	Hashing , Hash function	1
4.2	Separate Chaining	1
4.3	Open Addressing	1
4.4	Rehashing , Extendible Hashing	1
4.5	Priority Queues (Heaps) – Model	1
4.6	Simple Implementations	1
4.7	Binary Heap	1
4.8	Applications of Priority Queues , d-Heaps	2
5.0	**Graphs**	
5.1	Definitions , Topological Sort	
5.2	Shortest-Path Algorithms	1
5.3	Unweighted Shortest Paths	1
5.4	Dijkstra’s Algorithms	2
5.5	Minimum Spanning Tree – Prim’s Algorithms	1
5.6	Kruskal’s Algorithms	1
5.7	Applications of Depth-First Search – Undirected graphs	1
5.8	Biconnectivity	1

Course Designer(s)

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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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

Objectives

- To learn object oriented programming concept
- 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 problem.	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 multi threading concepts and IO Streams in various real world scenario.	Apply
CO5	Explore database using regular expression with JDBC.	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	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)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	10	10	10	10
Understand	10	10	10	10
Apply	40	40	70	70
Analyse	-	-	10	10
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 CS 004 – Java Programming

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** Feature of Java, The Java Environment, Java Source File Compilation, Structure of Java, Data Types, Variables, Operators, Control Flow, Arrays, Concepts of Object-Oriented 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]
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 List Iterator, String.	[9]
Java Multithread and I/O Streams ** Multi threaded 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, Meta characters.	[9]
Total Hours:	**45**

Text Book(s):

1.	HerbertSchildt,"Java:ThecompleteReference",ComprehensivecoverageoftheJavalanguage,Oracelepress,12th Edition,TataMcGraw-Hill,2021
2.	Vivian Siahaan, Rismon Hasiholan Sianipar,"Java In Practice: JDBC And Database Applications" Sparta Publishing,Kindle1st Edition, 2019.

Reference(s):

1.	KathySierra,Bert Bates,"HeadFirstJava",ABrainFriendlyGuide,O'Reilly,3Edition 2022.
2.	CayS.Horstmann,"CoreJavaVolume–IFundamentals",'11th Edition,2018.
3.	Y. Daniel Liang, "Introduction to Java Programming", Comprehensive Version,10th Edition, Pearson Education, 2015 [JDBC only].
4.	Jeffrey E.F .Friedl, "Mastering Regular Expressions",3rd Edition ,O'Reilly Media, Inc..2006

*SDG 9 – Industry Innovation and Infrastructure

**SDG 4 – Quality Education

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction of Java Fundamentals and Oop**	
1.1	Features of Java, The Java Environment, Java Source File Compilation	1
1.2	Structure of Java, Data Types, Variables, Operators	2
1.3	Control Flow, Arrays	1
1.4	Concepts of Object-Oriented Programming - OOP in Java	1
1.5	Defining classes and methods in Java	1
1.6	Constructors	1
1.7	Access Specifiers	1
1.8	Final and static keywords	1
2.0	**Java Oop Concepts and Strings**	
2.1	Java Inheritance	1
2.2	Polymorphism	1
2.3	Interface	1
2.4	Abstract class	1
2.5	Exception handling - exception hierarchy	1
2.6	Throwing and catching exceptions	1
2.7	Built-in exceptions	1
2.8	Creating own exceptions	1
2.9	String handling with String and String Buffer classes	1
3.0	**Packages and Collection Framework**	
3.1	Packages – Pre defined and user defined Packages	2
3.2	Boxing and Unboxing	1
3.3	Wrapper classes	1
3.4	Introduction to Collection	1
3.5	The Collection Interfaces – List, Set ,Map	1
3.6	Generic Class, Vector	1
3.7	Iterator and List Iterator	1
3.8	String Tokenizer	1
4.0	**Java Multithread and I/O Streams**	
4.1	Multi threaded programming	1
4.2	The Java Thread Model- Lifecycle ,The Main Thread	1
4.3	Creating a Thread, Creating multiple threads	1
4.4	Thread priority, Input /Output Basics	1
4.5	Streams, The Byte Streams	1
4.6	The Character Streams, Reading and Writing console	1
4.7	Reading and Writing files	1
4.8	Object Serialization and Object De-Serialization	2
5.0	**Java Database Connectivity and Regex**	
5.1	Database Programming – Introduction	1
5.2	SQL queries	2
5.3	JDBC, Statement, Prepared Statement	1
5.4	Regular Expression: Matcher class	1
5.5	Pattern class and Pattern Syntax	1
5.6	Exception class	1
5.7	Regex Character Classes and Quantifiers	1
5.8	Meta characters	1

Course Designer(s)

1.Mr.S.Vadivel – vadivels@ksrct.ac.in

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

60 AM 301	Formal Language and Automata Theory	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- 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

- Basic Knowledge of mathematics and Computer Systems

Course Outcomes

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

CO1	Comprehend the formal proofs, Inductive proofs and Finite Automata.	Understand
CO2	Apply regular expressions and the properties of regular languages.	Apply
CO3	Construction of context-free grammar and Push-down automata.	Apply
CO4	Interpret the uses of Turing machine and properties of Context-Free Languages.	Apply
CO5	Analyse the 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	2	2	-	-	-	-	1	-	-	2	-	2	2	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-	2	2	-
CO3	3	3	2	-	-	-	-	2	-	-	2	2	2	2	-
CO4	3	3	2	-	-	-	-	3	-	1	2	-	2	2	-
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)
	1	2		
Remember	10	20	30	30
Understand	20	20	30	30
Apply	30	20	40	40
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM 301 - Formal Language and Automata Theory								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	40	60	100

Introduction to Automata** Introduction to formal proof – Additional forms of proof – Inductive proofs –Finite Automata (FA): Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.	[6]
Regular Expressions and Languages* Regular Expression – Finite Automata and Regular Expressions – Properties of regular languages: Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.	[7]
Context-Free Grammar and Languages* Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages.	[5]
Pushdown Automata* Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and Context Free Grammars - Deterministic Pushdown Automata.	[7]
Properties of Context-Free Language** Normal forms for Context Free Grammars – Pumping Lemma for Context Free Languages - Closure Properties of Context Free Languages.	[5]
Turing Machines ** The Turing Machines – Programming Techniques for Turing Machine.	[6]
Undecidability* A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post's Correspondence Problem	[5]
Interactable Problems** Nondeterministic Polynomial Time (NP).	[4]
Total Hours: 45+15 (Tutorial)	**60**

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, 2013.
4.	Karibasappa K.G. Basavaraj S.Anami , "Formal Languages and Automata Theory",first edition, wiley publisher,2011.

*SDG 9 – Industry Innovation and Infrastructure

**SDG 4 – Quality Education

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Automata**	
1.1	Introduction to formal proof	1
1.2	Additional forms of proof	1
1.3	Inductive proofs	1
1.4	Finite Automata (FA): Deterministic Finite Automata (DFA)	1
1.5	Non-deterministic Finite Automata (NFA)	2
1.6	Finite Automata with Epsilon transitions	1
2.0	**Regular Expressions and Languages**	
2.1	Regular Expressions	1
2.2	Regular Finite Automata and Expressions	2
2.3	Properties of regular languages: Proving languages not to be regular	2
2.4	Closure properties of regular languages	1
2.5	Equivalence and minimization of Automata	2
3.0	**Context-Free Grammar and Languages**	
3.1	Context-Free Grammar (CFG)	2
3.2	Parse Trees	1
3.3	Ambiguity in grammars and languages	2
4.0	**Pushdown Automata**	
4.1	Definition of the Pushdown Automata	1
4.2	Languages of the Pushdown Automata	2
4.3	Equivalence of Pushdown automata and Context Free Grammars	2
4.4	Deterministic Pushdown Automata	2
5.0	**Properties of Context-Free Languages**	
5.1	Normal forms for Context Free Grammars	1
5.2	Pumping Lemma for Context Free Languages	2
5.3	Closure Properties of Context Free Languages	1
6.0	**Turing Machines**	
6.1	The Turing Machines	2
6.2	Programming Techniques for Turing Machine	2
7.0	**Undecidability**	
7.1	Recursively Enumerable A language that is not (RE)	1
7.2	An undecidable problem that is RE	1
7.3	Undecidable problems about Turing Machine	2
7.4	Post's Correspondence Problem	2
8.0	**Interactable Problem**	
8.1	The classes Polynomial Time (P) and Nondeterministic Polynomial time(NP)	3

Course Designer(s)

1. Mr.R.VijaySai - vijaysair@ksrct.ac.in

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

60 AM 302	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 discuss in detail, the operation of the arithmetic unit including the algorithms and implementation of data manipulation
- To study in detail, the different types of control and the concept of pipelining and study the hierarchical memory system, cache memory
- To study the different ways of communicating with I/O devices and standard I/O interfaces
- To understand the instruction and thread level parallelism concepts and multi core processors

Pre-requisites

- Basic knowledge of Software and Hardware

Course Outcomes

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

CO1	Acquire Knowledge on the basic structure of computer, Instruction sequencing and Addressing modes.	Understand
CO2	Apply the basic design of Addition and subtraction for fixed point numbers, multiplication and division of fixed numbers and basics of floating point numbers.	Apply
CO3	Analyse the concept of Instruction execution, generation of control signals, pipelining and hazards.	Analyse
CO4	Apply the concept of Cache memory and its performance, interrupts, buses, Direct Memory Access and Standard I/O interfaces.	Apply
CO5	Analyse Parallelism concepts, compiler techniques, multiprocessor architecture and case studies on Intel's processors.	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	-	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)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	10	10	20	20
Understand	20	10	20	20
Apply	30	20	30	30
Analyse	-	20	30	30
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM 302 – Computer Architecture								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	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]
Additional Topics* Instruction Level Parallelism: ILP concepts – Pipelining overview - Compiler Techniques for Exposing ILP – Dynamic Branch Prediction – 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 Safwat Zaky, 6th Edition"ComputerOrganization", McGraw-Hill, 2021.
2.	John P.Hayes, "Computer Architecture and Organization", 3rd Edition, McGrawHill, 2017
Reference(s):	
1.	William Stallings, "Computer Organization and Architecture- DesigningforPerformance "11th Edition, Pearson Education, 2022.
2.	Cay S.Horstmann, "Core Java Volume – I Fundamentals",' 11th Edition, 2018.
3.	https://www.intel.in/content/www/in/en/products/processors/atom.html

*SDG 9 – Industry Innovation and Infrastructure

**SDG 4 – Quality Education

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Basic Structure of computers**	
1.1	Functional units	1
1.2	Basic operational concepts	1
1.3	Bus Structures	1
1.4	Software performance	1
1.5	Memory locations and addresses	1
1.6	Memory operations	1
1.7	Memory operations –Instruction and instruction sequencing	1
1.8	Addressing modes–Assembly language	1
1.9	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 address	1
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	2
3.0	**Basic Processing Unit**	
3.1	Fundamental concepts	1
3.2	Execution of a complete instructions	1
3.3	Multiple bus organization	1
3.4	Hardwired control	1
3.5	Micro programmed control, Pipelining	1
3.6	Basic concepts – Data hazards, Instruction hazards	1
3.7	Influence on Instruction sets	1
3.8	Data path and control considerations	1
3.9	Superscalar operation	1
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, Interrupts	1
4.5	Direct Memory Access	2
4.6	Buses	1
4.7	Interface Circuits – PCI,USB	2
5.0	**Additional Topics**	
5.1	Instruction Level Parallelism: ILP concepts	
5.2	Pipelining overview	1
5.3	Compiler Techniques for Exposing ILP	1
5.4	Dynamic Branch Prediction	1
5.5	Dynamic Scheduling	1
5.6	Hardware Based Speculation, Static scheduling	1
5.7	Thread Level Parallelism: Symmetric and Distributed Shared Memory Architectures	2
5.8	Case studies: Intel core i7, Atom Processors	1

Course Designer(s)

1. Saradha.M - saradha@ksrct.ac.in

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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

Objectives

- 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.	Analyse
CO3	Identify and evaluate the role of harmony in family, society and universal order.	Analyse
CO4	Classify and associate the holistic perception of harmony at all levels of existence and Nature	Analyse
CO5	Develop appropriate human conduct and management patterns to create harmony in professional and personal lives.	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	-	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	-
Understand	10	10	
Apply	20	20	
Analyse	20	20	
Evaluate	-	-	
Create	-	-	
Total	60	60	

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to All Branches								
60 MY 002 - Universal Human Values								
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 Education - Continuous Happiness and Prosperity - The Basic Human Aspirations - Right Understanding - Relationship and Physical Facility – Happiness and Prosperity - Current Scenario – Method to Fulfil 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 Evaluation – Understanding 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 Fulfilment 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 Models - Typical Case Studies – Strategies for Transition Towards Value Base Life and Profession.	[9]
Total Hours:	**45**

Text Book(s):	
1.	A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2.	Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana.
Reference(s):	
1.	Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2.	Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak,2004.

*SDG-Quality Education
**SDG 3 – Good Health and Well Being
***SDG 7 – Affordable and Clean Energy

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**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 fulfil 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
2.0	**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	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
2.7	My Participation (Value) regarding Self and my Body - Correct Appraisal of our Physical needs	1
3.0	**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
4.0	**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 Fulfilment	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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

60 GE 002	Tamils and Technology	Category	L	T	P	Credit
		GE	1	0	0	1*

Objectives

- To learn weaving, ceramic and construction technology of Tamils
- To understand the agriculture, irrigation and manufacturing technology of Tamils
- To realize the development of scientific Tamil and Tamil computing

Pre-requisites

NIL

Course Outcomes

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

CO1	Understand the weaving and ceramic technology of ancient Tamil people nature.	Understand
CO2	Comprehend the construction technology, building materials in sangam period and case studies.	Understand
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence.	Understand
CO4	Realize the agriculture methods, irrigation technology and pearl diving.	Understand
CO5	Apply the knowledge of scientific Tamil and Tamil computing.	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	-	-	-
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	Model Examination (Marks)	End Semester Examination (Marks)
Remember	40	-
Understand	40	-
Apply	20	-
Analysis	-	-
Evaluate	-	-
Create	-	-

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to all Branches								
60 GE 002 – Tamils and Technology								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	1	0	0	15	1*	100	-	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**
Text Book(s):	

1.	முனைவர் கே. கே. பிள்ளை, தமிழக வரலாறு - மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 18th Ed, 2022.
2.	முனைவர் இல. சுந்தரம், கணினித்தமிழ்,விகடன் பிரசுரம், 2nd Ed, 2021
3.	முனைவர் இரா.சிவானந்தம், மு.சேரன், கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, 6th Ed 2020.
4.	முனைவர் இரா.சிவானந்தம் , முனைவர் ஜெ.பாஸ்கர், பொருநை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு,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,
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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

60 GE 002	தமிழரும் தொழில்நுட்பமும் (அனைத்து துறைகளுக்கும் பொதுவானது)	Category	L	T	P	Credit
		GE	1	0	0	1*

பாடத்தின் நோக்கங்கள்**:**

- தமிழர்களின் சங்ககால நெசவு, பனை வனைதல் மற்றும் கட்டிட தொழில் நுட்பம் குறித்து அறிதல்.
- தமிழர்களின் சங்ககால வேளாண்மை, நீர்ப்பாசனம் மற்றும் உற்பத்தி முறைகள் குறித்த கற்றல்.
- நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த புரிதல்.

முன்கூட்டிய துறைசார் அறிவு**:**

தேவை இல்லை

பாடம் கற்றதின் விளைவுகள்:

பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

CO1	சங்ககாலத் தமிழர்களின் நெசவு மற்றும் பானை வனைதல் தொழில்நுட்பம் குறித்த கற்றுணர்தல்	புரிதல்
CO2	சங்ககாலத் தமிழர்களின் கட்டிட தொழில்நுட்பம் கட்டுமானப் பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்த அறிவு.	புரிதல்
CO3	சங்ககாலத் தமிழர்களின் உலோகத் தொழில், நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு.	புரிதல்
CO4	சங்ககாலத் தமிழர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு.	புரிதல்
CO5	நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த புரிந்துகொள்ளலும் மற்றும் பயன்படுத்துதலும்.	பகுப்பாய்வு

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	Model Examination (Marks)	End Semester Examination (Marks)
Remember	40	-
Understand	40	-
Apply	20	-
Analysis	-	-
Evaluate	-	-
Create	-	-

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

அனைத்து துறைகளுக்கும் பொதுவானது

60 GE 002 – தமிழரும் தொழில்நுட்பமும்

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	1	0	0	15	1*	100	-	100

நெசவு மற்றும் பானைத் தொழில்நுட்பம்* சங்க காலத்தில் நெசவுத் தொழில் -பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.	[3]
வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்* சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.	[3]
உற்பத்தித் தொழில் நுட்பம்* கப்பல் கட்டும் கலை - உலோகவியல் -இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் -மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.	[3]
வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்* அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்.	[3]
அறிவியல் தமிழ் மற்றும் கணித்தமிழ்* அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் -தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.	[3]
Total Hours	**15**

Text Book(s):

1.	முனைவர் கே. கே. பிள்ளை, தமிழக வரலாறு - மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 18th Ed, 2022.
2.	முனைவர் இல. சுந்தரம், கணினித்தமிழ்,விகடன் பிரசுரம், 2nd Ed 2021
3.	முனைவர் இரா.சிவானந்தம், மு.சேரன், கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, 6th Ed 2020.
4.	முனைவர் இரா.சிவானந்தம் , முனைவர் ஜெ.பாஸ்கர், பொருநை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு,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.

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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
Reference(s):	
1.	R.Balakrishnan , “Journey of Civilization Indus to Vaigai”, Published by: RMRL

Course Designer(s)

1. Dr.A.M.Venkatachalam – amvenku@ksrct.ac.in

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

60 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 structure
- To strengthen the ability to identify and apply the suitable data structure for the given real world problems
- To program for storing data as tree structure and implementation of various traversal techniques
- To implement sorting and searching techniques
- To gain knowledge of graph applications

Pre-requisites

- Programming language in C

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.	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	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	3	3	2	-	2	3	3	-
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom'sCategory	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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 CS 0P3 – Data Structures Laboratory								
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 Search Tree ADT*
6. Implementation of Internal Sorting*
7. Develop a program for External Sorting*
8. Develop a program for Various Searching Techniques*
9. Implementation of Shortest Path Algorithm*
10. Implementation of Minimum Spanning Tree Algorithm*

Lab Manual

1.	“Data Structures Lab Manual”, Department of Computer Science and Engineering, KSRCT.

*SDG 4 – Quality Education

Course Designer(s)

1. K.Poongodi – poongodi@ksrct.ac.in

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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
- 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 problem

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.	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	3	2	3	3	-	-
CO2	3	3	2	-	3	-	-	2	3	3	2	3	3	-	-
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	2	-
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom'sCategory	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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 CS 0P4 – Java Programming Laboratory								
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.

Lab Manual	
1.	"Java Programming Lab Manual", Department of Computer Science and Engineering, KSRCT.

*SDG 9 – Industry Innovation and Infrastructure
**SDG 4 – Quality Education

Course Designer(s)

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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

60 CG 0P2	Career Skill Development II	Category	L	T	P	Credit
		CG	0	0	2	1*

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.	Analyse
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.	Analyse
CO4	Solve the quantitative problems pertaining to calculations of averages, ratio and proportions, and profit and loss effectively at the pre-Intermediate 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
CO2	3	3	3	3	-	2	-	-	-	2	3	3	-	-	2
CO3	2	2	2	2	-	3	-	-	-	2	3	3	-	-	2
CO4	3	3	3	3	-	2	-	-	-	2	3	3	-	-	2
CO5	3	3	3	3	-	2	-	-	-	2	3	3	-	-	2
3 - Strong; 2 - Medium; 1 – Some															

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 CG 0P2 – Career Skill Development II								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	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**

Text Book(s):	
1.	**NIL**
Reference(s):	
1.	Aggarwal, R.S.'A Modern Approach to Verbal and Non-verbal Reasoning' ,Revised Edition 2008,Reprint 2009,S.Chand&CoLtd.,New Delhi.
2.	AbhijitGuha, 'Quantitative Aptitude', McGraw Hill Education, 6th edition,2016
3.	DineshKhattar, 'Quantitative Aptitude For Competitive Examinations', Pearson Education 2020.
4.	Anne Thomson ,'Critical Reasoning: A Practical Introduction'LexiconBooks,3rd edition,2022.

*SDG 4 – Quality Education

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Logical Reasoning**	
1.1	Analogies- Alpha and numeric series	1
1.2	Number Series - Coding and Decoding	1
1.3	Blood Relations - Coded Relations	1
1.4	Order and Ranking, odd man out	1
1.5	Direction and Distance	2
2.0	**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	1
2.5	Surds& Indices	2
3.0	**Critical Reasoning**	
3.1	Syllogism	1
3.2	Statements and Conclusions ,Cause and effects	1
3.3	Statements and Assumptions	1
3.4	Identifying Strong Arguments and Weak Arguments	1
3.5	Cause and Action- Data sufficiency	2
4.0	**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
5.0	**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)

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

Passed in BoS Meeting held on 22/12/2022

Approved in Academic Council Meeting held on 07/01/2023 BoS Chairman Signature

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 2022 - 2023)

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 020	Inferential Statistics and Numerical Methods	2	40	60	100	45	100
2	60 IT 002	Design and Analysis of Algorithms	2	40	60	100	45	100
3	60 AM 401	Artificial Intelligence	2	40	60	100	45	100
4	60 AM 402	Software Engineering	2	50	50	100	45	100
5	60 AM 403	Database Management Systems	2	40	60	100	45	100
6	60 OE L1*	Open Elective I	2	40	60	100	45	100
7	60 MY 003	Startups and Entrepreneurship	2	100	-	100	-	100
PRACTICAL								
8	60 AM 4P1	Artificial Intelligence Laboratory	3	60	40	100	45	100
9	60 AM 4P2	Database Management Systems Laboratory	3	60	40	100	45	100
10	60 CG 0P3	Career Skill Development III	1	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, 50 marks for theory cum practical End Semester Examination and 40 marks for Practical End Semester Examination.

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

60 MA 020	Inferential Statistics And Numerical Methods	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To learn the basic concepts of descriptive statistics
- To familiarize the concepts of correlation and regression
- To get exposed to various techniques to solve equations numerically
- To know the concepts of interpolation and numerical integration
- To learn the basics concepts of initial value problems

Pre-requisites

- Nil

Course Outcomes

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

CO1	Compute measures of central tendency and measures of dispersion.	Apply
CO2	Calculate coefficient of correlation and regression.	Apply
CO3	Apply various iteration techniques for solving algebraic, transcendental and system of linear equations.	Apply
CO4	Apply different techniques to find the intermediate values and to evaluate single definite integrals.	Apply
CO5	Compute the solution for initial value problems using single and multi-step methods.	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	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO5	3	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)
	1	2		
Remember	10	10	10	10
Understand	10	10	20	20
Apply	40	40	70	70
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E - CSE(Artificial Intelligence and Machine Learning)

60 MA 020 - Inferential Statistics and Numerical Methods

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

Empirical Statistics **Measures of central tendency***: Mean, Median and Mode- Measures of dispersion: Range – Quartile deviation -Standard deviation –Skewness. **Hands – on:** Calculate mean, median, mode and range for discrete frequency distribution	[9]
Two Dimensional Random Variables Joint distributions - Marginal and conditional distributions – Covariance – **Correlation*** and Regression - Rank Correlation **Hands – on:** Calculate the correlation coefficient matrix and Simple Linear Regression	[9]
Solution of Equations and Eigen Value Problem Algebraic and Transcendental equations - Newton Raphson method –Method of False position - Gauss elimination method – Gauss Jordan method– Iterative methods: Gauss Jacobi method – GaussSeidel method – Eigen value of a matrix by Power method. **Hands – on:** Calculate the Gauss-Jacobi and Gauss-Seidal method for system of linear equations	[9]
Interpolation and Numerical Integration **Lagrange's and Newton's divided difference interpolations (unequal intervals)** **-** **Newton's forward and backward interpolation (equal intervals)** **-Two point and three point Gaussian quadrature –Trapezoidal, Simpson's1/3 and 3/8 rule (single integral). **Hands – on:** Demonstrate Trapezoidal and Simpson's rule	[9]
Numerical Solution of Ordinary Differential Equations Single step methods: Taylor's series method - Euler's method -Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multistep methods: Milne's predictor and corrector method - Adam's predictor and corrector method. **Hands – on:** Calculate the solution of Ordinary Differential Equations using Milne's and Adam's Predictor and Corrector method.	[9]
Total Hours: 45 + 15 (Tutorial)	**60**

Text Book(s):

1.	S.P.Gupta, "Statistical Methods", Sultan Chand & sons, 46thRevised Edition, New Delhi, 2021.
2.	Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

Reference(s):

1.	P Kandasamy, K Thilagavathy and K Gunavathi, 'Numerical Methods', S. Chand& Company Ltd, 3rd Edition, 2003.
2.	S.M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists", 5thEdition, Academic Press, 2014.
3.	V. K. Kapoorand S.C.Gupta , "Fundamentals of Mathematical Statistics ",Publishers: Sultan Chand & sons 12th Edition, New Delhi, 2020.
4.	Faires, J D and Burden R, "Numerical Methods", Thomson publications, Fourth Edition, New Delhi, 2012.

*SDG 4 – Quality Education

**SDG 9 – Industry, Innovation, and Infrastructure

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Empirical Statistics**	
1.1	Mean, Median and Mode	2
1.2	Range	2
1.3	Quartile deviation	2
1.4	Standard deviation	2
1.5	Skewness	1
1.6	Tutorial	2
1.7	Hands on	1
2.0	**Relational Model**	
2.1	Joint distributions	1
2.2	Marginal distributions	1
2.3	Conditional distributions	1
2.4	Covariance	1
2.5	Correlation	2
2.6	Regression	2
2.7	Rank Correlation	1
2.8	Tutorial	2
2.9	Hands on	1
3.0	**Solution of Equations and Eigen Value Problem**	
3.1	Newton-Raphson method	1
3.2	Method of False position	2
3.3	Gaussian elimination method	1
3.4	Gauss-Jordan method	1
3.5	Gauss-Jacobi method	1
3.6	Gauss-Seidel method	2
3.7	Eigen value of a matrix by Power method	1
3.8	Tutorial	2
3.9	Hands on	1
4.0	**Interpolation and Numerical Integration**	
4.1	Lagrange's divided difference interpolation	2
4.2	Newton's divided difference interpolation	2
4.3	Newton's forward and backward interpolations	2
4.4	Two and three point Gaussian quadrature	1
4.5	Trapezoidal and Simpson's 1/3 and 3/8 rules	2
4.6	Tutorial	2
4.7	Hands on	1
5.0	**Numerical Solution of Ordinary Differential Equations**	
5.1	Taylor series method	2
5.2	Euler's method	1
5.3	Modified Euler's method	1
5.4	Runge - Kutta method	2
5.5	Milne's predictor and corrector method	1
5.6	Adam's predictor and corrector method	2
5.7	Tutorial	2
5.8	Hands on	1
	Total	**60**

Course Designer(s)

1. Ms.V.Thivya- thivya@ksrct.ac.in

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

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
CO2	Apply and inspect recursive and non-recursive algorithms by mathematical notations using sample algorithms.	Analyse
CO3	Apply 'Brute Force' and 'Divide and conquer' design techniques for sorting and searching problems	Analyse
CO4	Construct analogous algorithms for graph related problems.	Understand
CO5	Apply 'Backtracking' and 'Branch and bound' techniques to solve NP-hard 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	-	-	-	-	-	3	-	-	3	2	-
CO2	3	3	3	2	-	-	-	-	-	3	-	-	3	2	-
CO3	3	3	3	2	3	-	-	-	-	3	-	-	3	2	-
CO4	3	3	3	2	-	-	-	-	-	3	-	-	3	2	-
CO5	3	3	3	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)
	1	2		
Remember	-	-	20	20
Understand	20	20	20	20
Apply	20	20	20	20
Analyse	20	20	40	40
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE(Artificial Intelligence and Machine Learning)								
60 IT 002 - Design and Analysis of Algorithms								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
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.	AnanyLevitin, "Introduction to the Design and Analysis of Algorithm", 3rd Edition, Tenth Impression, Pearson Education Asia, 2017.
2.	T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms", 3rd Edition, PHI Pvt. Ltd., 2012.
Reference(s):	
1.	Martin W, Stockel and Martin T Stockle, "Automotive Mechanics Fundamentals", The Good Heart – Will Cox Company Inc, USA, 2012.
2.	A.V.Aho, J.E. Hopcroft and J.D.Ullman, "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

**SDG 9 – Industry, Innovation, and Infrastructure

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Basic Concepts of Algorithms**	
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
2.0	**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
3.0	**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
4.0	**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
5.0	**NP Hard and NP-Complete Problems**	
5.1	P and NP problems	1
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

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

60 AM 401	Artificial Intelligence	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To learn the basic concepts and techniques of Artificial Intelligence
- To develop AI algorithms for solving practical problems
- To interpret the knowledge and reasoning in propositional logic and first order logic
- To learn 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

- Basic Knowledge of Computer Programming and Algorithms

Course Outcomes

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

CO1	Acquire the knowledge on basic concepts and techniques of Artificial Intelligence.	Remember
CO2	Apply AI algorithms for solving practical problems.	Apply
CO3	Analyse human intelligence and AI.	Analyse
CO4	Apply deep learning algorithms and models to implement the system model.	Apply
CO5	Apply basics of Fuzzy logic and neural networks, 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	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	2	-	-	-	-	-	-	-	-	3	-
CO3	3	2	2	2	2	-	-	-	-	-	-	-	-	3	-
CO4	3	2	2	2	2	-	-	-	-	-	-	-	-	3	-
CO5	3	3	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)
	1	2		
Remember	30	-	20	20
Understand	10	-	-	-
Apply	20	30	60	60
Analyse	-	30	20	20
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E - CSE(Artificial Intelligence and Machine Learning)

60 AM 401 - Artificial Intelligence

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* Artificial Intelligence and its Applications - Artificial Intelligence Techniques - Level of Models - Criteria of Success - Intelligent Agents - Nature of Agents - Learning Agents - AI Techniques - Advantages, and Limitations of AI - Impact and Examples of AI - Application domains of AI - The AI Ladder - The Journey for Adopting AI Successfully - Advice for a career in AI - Hotbeds of AI Innovation.	[9]
Problem Solving Techniques* State Space Search - Control Strategies - Heuristic Search - Problem Characteristics - Production System Characteristics., Generate and Test - Hill Climbing - Best First Search - A* search - Constraint Satisfaction Problem - Means-end Analysis - Min-Max Search - Alpha-Beta Pruning - Additional Refinements - Iterative Deepening.	[9]
Logic* Propositional logic - predicate logic - Resolution - Resolution in proportional logic and predicate logic - Clause form - Unification algorithm,	[9]
Knowledge Representation Schemes and Reasoning* Mapping between facts and representations - Approaches to knowledge representation - Procedural vs Declarative Knowledge - Forward vs. Backward reasoning – Matching - Conflict Resolution - Non-monotonic reasoning - Default reasoning - statistical reasoning - Fuzzy Logic - Weak and Strong filler structures - Semantic Nets - Frames - Conceptual Dependency - Scripts - Introduction to AI and ML - Machine Learning Fundamentals - Deep learning.	[9]
Planning** The Planning Problem - Planning with State Space Search - Partial Order Planning - Planning Graphs - Planning with Propositional Logic - Analysis of planning approaches - Hierarchical Planning - Conditional Planning - Continuous and Multi Agent Planning. - 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”, Third Edition, Pearson Education, 2018.
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, 2017.
2.	Nils J. Nilsson, “The Quest for Artificial Intelligence”, Cambridge University Press, 2019.
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

**SDG 3 – Good Health and Well Being

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Artificial Intelligence and its applications	1
1.2	Artificial Intelligence Techniques	1
1.3	Level of models, criteria of success	1
1.4	Intelligent Agents, Nature of Agents, Learning Agents	1
1.5	AI Techniques, advantages and limitations of AI	1
1.6	Impact and Examples of AI, Application domains of AI	1
1.7	The AI Ladder	1
1.8	The Journey for Adopting AI Successfully, Advice for a career in AI	1
1.9	Hotbeds of AI Innovation	1
2.0	**Problem solving techniques**	
2.1	State space search, control strategies	1
2.2	Heuristic search, problem characteristics	1
2.3	Production system characteristics	1
2.4	Generate and test, Hill climbing	1
2.5	Best first search, A* search	1
2.6	Constraint satisfaction problem	1
2.7	Mean-end analysis	1
2.8	Min-Max Search	1
2.9	Alpha-Beta Pruning, Additional refinements, Iterative Deepening	1
3.0	**Logic**	
3.1	Propositional logic	2
3.2	Predicate logic	2
3.3	Resolution	1
3.4	Resolution in proportional logic and predicate logic	2
3.5	Clause form	1
3.6	Unification algorithm	1
4.0	**Knowledge Representation Schemes and Reasoning**	
4.1	Mapping between facts and representations, Approaches to knowledge representation	1
4.2	Procedural vs declarative knowledge, Forward vs. Backward reasoning	1
4.3	Matching, conflict resolution	1
4.4	Non-monotonic reasoning	1
4.5	Default reasoning, Statistical reasoning	1
4.6	Fuzzy logic Weak and Strong Filler Structures	1
4.7	Semantic Nets, Frames	1
4.8	Conceptual dependency, Scripts	1
4.9	Introduction to AI and ML-Machine learning fundamentals, Deep Learning	1
5.0	**Planning**	
5.1	The Planning problem	
5.2	Planning with state space search	1
5.3	Partial order planning	1
5.4	Planning graphs	1
5.5	Planning with propositional logic	1
5.6	Analysis of planning approaches	1
5.7	Hierarchical planning, Conditional planning	1
5.8	Continuous and Multi Agent planning	1
5.9	NLP and Computer Vision	1

Course Designer(s)

1. R.Vijaysai – vijaysair@ksrct.ac.in

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

60 AM 402	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	Analyse the key activities in managing a software process and project	Analyse
CO2	Analyse the concepts of requirements engineering and Modeling.	Analyse
CO3	Apply systematic procedure for software design and deployment.	Apply
CO4	Compare and contrast the various testing and maintenance.	Analyse
CO5	Analyse project timeline, estimate project cost and Identify Risk	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	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 - 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	Theory	Lab	Theory	Lab
Remember	10	-	10	-	30	-	30	-
Understand	10	-	10	-	20	-	20	-
Apply	20	50	20	50	30	50	30	50
Analyse	20	50	20	50	20	50	20	50
Evaluate	-	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100	100

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE(Artificial Intelligence and Machine Learning)

60 AM 402- 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.	[9]
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 nets – Data Dictionary	[9]
Software Design Design process – Design Concepts - Design Model – Design Heuristic – Architectural Design – Architectural styles, Architectural Design, Architectural Mapping using Data Flow-User Interface Design: Interface analysis, Interface Design – Component level Design: Designing class based components, Traditional based components	[9]
Testing and Maintenance Software testing fundamentals – Internal and external views of testing - White box testing – Basis path testing – Control structure testing – Black box testing – Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing – Debugging – Software Implemenmtation Techniques: Coding Practices – Refactoring – Maintanance and Reengineering – BPR Model - Reengineering process model – Reverse and Forward Engineering	[9]
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.	[9]
Practical: 1. Prepare a SRS document in line with the IEEE recommended standards. 2. Draw the Entity Relationship diagram of a project of your choice. 3. Draw Data Flow Diagram at Level 0 and Level 1. 4.Draw the Use-case diagram and activity diagram using Star UML 5.Draw Class diagram and component diagram using Star UML 6.Draw Sequence diagram and Collaboration diagram using Star UML 7.Develop a project with all Software Engineering Concepts	[15]
Total Hours:	60

Text Book(s):

1.	Roger S. Pressman, ”Software Engineering ” – A Practitioner’s Approach, Seventh Edition, Mc Graw-Hill International Edition, 2010.
2.	Ian Sommerville, “Software Engineering ”, 9th Edition, Pearson Education Asia, 2011.

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.

*SDG4 – Quality Education

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Software Process and Agile Development**	
1.1	Introduction to Software Engineering	1
1.2	Software Development Lifecycle	2
1.3	Software Process, Perspective	1
1.4	Specialized Process Models	1
1.5	Specialized Process Models	1
1.6	Introduction to Agility-Agile process	1
1.7	Extreme programming	1
1.8	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	Software Requirements Document	1
2.4	Requirement Engineering Process: Feasibility Studies	1
2.5	Requirements elicitation and analysis	1
2.6	Requirements elicitation and analysis	1
2.7	Requirements validation	1
2.8	requirements management	1
2.9	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	1
3.6	Interface analysis	1
3.7	Component level Design: Designing Class based components	2
3.8	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	1
4.3	White box testing- control structure testing	1
4.4	Black box testing-Regression Testing, Unit Testing , Integration Testing	1
4.5	Black box testing–Validation Testing, System Testing	1
4.6	Debugging, Software Implementation Techniques	1
4.7	Coding practices, Refactoring-Maintenance and Reengineering	1
4.8	BPR model, Reengineering process model	1
4.9	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	Make/Buy Decision COCOMO I & II Model	1
5.4	Scheduling and Earned Value Analysis Planning	1
5.5	Project Plan and Planning Process	1
5.6	Project Plan and Planning Process	1
5.7	RFP Risk Management–Identification	1
5.8	Projection-Risk Management	1

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

5.9	Risk Identification, RMMM Plan,CASE Tools	1
Practical:		
1.	Prepare a SRS document inline with the IEEE recommended standards.	15
2.	Draw the Entity Relationship diagram of a project of your choice.	
3.	Draw Data Flow Diagram at Level 0 and Level 1.	
4.	Draw the Use-case diagram and activity diagram using Star UML	
5.	Draw Class diagram and component diagram using Star UML	
6.	Draw Sequence diagram and Collaboration diagram using Star UML.	
7.	Develop a project with all Software Engineering Concepts.	

Course Designer(s)

1.Dr.B.G. GEETHA- geetha@ksrct.ac.in

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

60 AM 403	Database Management Systems	Category	L	T	P	Credit
		PC	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

- Basic knowledge of Data Storage and Management

Course Outcomes

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

CO1	Apply the knowledge of database systems and analyze the various data models.	Analyse
CO2	Apply the concept of Data Definition Language and Data Manipulation Language and apply the various Normal Forms in database design	Apply
CO3	Apply 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	Analyse
CO5	Analyse the recent databases such and Express the knowledge of data ware housing and data mining	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	-
CO2	3	3	2	-	2	2	2	-	-	-	-	-	-	3	-
CO3	3	3	2	-	2	-	-	-	-	-	-	-	-	3	-
CO4	3	3	2	-	2	2	2	-	-	-	-	-	-	3	-
CO5	3	3	2	-	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)
	1	2		
Remember	10	10	10	10
Understand	10	10	10	10
Apply	20	20	40	40
Analyse	20	20	40	40
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE(Artificial Intelligence and Machine Learning)

60 AM 403 - 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 - IntermediateSQL - AdvancedSQL - Triggers - Functions and Procedures - Embedded SQL - Normalization for Relational Databases (upto5NF).	[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 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, 2019.
2.	Ramez Elmasri and Shamkant B.Navathe, “Fundamental Database Systems”, Fifth Edition, Pearson Education, 2021.

Reference(s):

1.	Raghu Ramakrishnan,“Database Management System”,Tata McGraw-Hill Publishing Company,2018.
2.	Hector Garcia – Molina, Jeffrey D.Ullman and Jennifer Widom - “Database System Implementation” - Pearson Education.
3.	Peter Roband Corlos Coronel Database System, Design, Implementation and Management”, Thompson Learning Course Technology- Fifth edition, 2011.
4.	Rajiv Chopra, “Database Management System a Practical Approach“, S.Chand & co, Fifth Edition.

*SDG 4 – Quality Education

**SDG 9 – Industry, Innovation, and Infrastructure

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction and Conceptual Modeling**	
1.1	Introduction to database	1
1.2	Applications of DBMS.	1
1.3	Different Views of Data	1
1.4	Database System Architecture	1
1.5	Database Administrator	1
1.6	Entity Relationship Model	1
1.7	Tuple and Domain Relational Calculus	1
1.8	E-R Diagram Banking application	1
1.9	Hierarchical Model and Network Model	1
2.0	**Relational Model**	
2.1	Structure Query Language introduction	1
2.2	Data Definition Language	1
2.3	Data Manipulation Language – Select with where and order by	1
2.4	Select using aggregate function	1
2.5	Select using group by and having clause	1
2.6	Sub query and Views	1
2.7	Triggers	1
2.8	Function and Procedures	1
2.9	Normalization	1
3.0	**Data Storage and Indexing Concepts**	
3.1	Fixed and Variable length record structure	1
3.2	File Organization	1
3.3	RAID	1
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	2
4.0	**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
4.8	Recovery Technique – Deferred Update	1
5.0	**Current Trends**	
5.1	Object Oriented Database	1
5.2	Distributed Database Concept and Types	1
5.3	Distributed Transaction – Two-Phase Commit Protocol	1
5.4	Distributed Transaction – Three-Phase Commit Protocol	1
5.5	Distributed Data Storage	1
5.6	Data Mining Concept and Applications	1
5.7	Classification Algorithms, Clustering Algorithms	1
5.8	Data Warehouse Concept and Preprocessing	1
5.9	Data Warehouse Schema Models, Designing three dimensional OLAP Cube with its operations	1

Course Designer(s)

1. Dr A GNANABASKARAN - gnanabaskarana@ksrct.ac.in

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

60 MY 003	Startups and Entrepreneurship	Category	L	T	P	Credit
		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 prototype.
- 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

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 & Viva 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	

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

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
IV	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]
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

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

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**	
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 your Idea and Understand Revenue Model (Handout week 6)	1
3.4	Prototyping, Meaning of MLP, Difference **B**etween 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

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

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
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

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

60 AM 4P1	Artificial Intelliegnce Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To learn the basic concepts and techniques of Artificial Intelligence
- To develop AI algorithms for solving practical problems
- To improve programming skills in languages by writing, testing, and debugging code to solve complex problem
- To evaluate the performance of different algorithms in terms of time and space complexity
- To understand their applicability and effectiveness in various scenarios

Pre-requisites

- Basic knowledge of Computer Programming and Algorithms

Course Outcomes

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

CO1	Acquire knowledge on the basic concepts and techniques of Artificial Intelligence Interaction.	Apply
CO2	Apply AI algorithms for solving practical problems.	Apply
CO3	Apply human intelligence and AI concepts.	Apply
CO4	Analyse the performance of intelligent system.	Analyse
CO5	Apply basics of Fuzzy logic and 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	2	2	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	2	-	-	-	-	-	-	-	-	3	-
CO3	3	2	2	2	2	-	-	-	-	-	-	-	-	3	-
CO4	3	2	2	2	2	-	-	-	-	-	-	-	-	2	-
CO5	3	3	2	2	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

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE(Artificial Intelligence and Machine Learning)								
60 AM 4P1 – Artificial Intelligence Laboratory								
Semester	**Hours/Week**			**Total**	**Credit**	**Maximum Marks**		
	L	T	P	**Hrs**	C	CA	ES	Total
IV	0	0	4	60	2	60	40	100

List of Experiments:

1. Study of PROLOG Programming language and its Functions. Write Simple facts for the statements using PROLOG
2. Implementation of Depth First Search for Water Jug problem
3. Implementation of Breadth First Search for Tic-Tac-Toe problem
4. Solve 8-puzzle problem using Best First Search
5. Write PROLOG program to solve N-Queens problem
6. Implementation of traveling Salesman Problem*
7. Implementation of Tower of Hanoi Problem
8. Implementation of Monkey Banana Problem**

Design Experiments:

1. Solve N-Queens Problem
2. Implementation of Missionaries-Cannibals Problem

Lab Manual	
1.	"Artificial Intelligence Lab Manual", Department of CSE (AIML), KSRCT.

*SDG 9 – Industry Innovation and Infrastructure

**SDG 4 – Quality Education

Course Designer(s)

1. R.Vijay Sai – vijaysair@ksrct.ac.in

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

60 AM 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 like payroll
- To apply procedures and functions in PL/SQL

Pre-requisites

- Basic Knowledge of Data Storage and Management

Course Outcomes

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

CO1	Apply the Data Definition Language, Data Manipulation Language and Data Control Language commands in RDBMS.	Apply
CO2	Apply the Sub queries to retrieve data from multiple tables.	Apply
CO3	Apply the High-level language extension with Cursors and Triggers.	Apply
CO4	Apply the Procedures and Functions in PL/SQL.	Apply
CO5	Apply the views, joins and Embedded SQL In RDBMS.	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	-
CO2	3	3	3	-	3	-	-	-	-	-	-	-	2	2	-
CO3	3	3	3	-	3	-	-	-	-	-	-	-	2	2	-
CO4	3	3	3	-	3	-	-	-	-	-	-	-	2	2	-
CO5	3	3	3	-	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	-	-	-	-
Understand	-	-	-	-
Apply	50	25	100	100
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE(Artificial Intelligence and Machine Learning)								
60 AM 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

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. Design and implementation of Payroll Processing System.

Design Experiments:

1. Design and implementation of Banking System.
2. Design and implementation of Railway Reservation System.

Lab Manual

1.	"Database Management Systems Lab Manual", Department of CSE (AIML), KSRCT.

*SDG 9 – Industry Innovation and Infrastructure
**SDG 4 – Quality Education
***SDG 9 – Industry, Innovation, and Infrastructure

Course Designer(s)

1. Dr A Gnanabaskaran - gnanabaskarana@ksrct.ac.in

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

60 CG 0P3	Career Skill Development III	Category	L	T	P	Credit
		CG	0	0	2	1*

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.	Analyse
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.	Analyse
CO4	Infer critically the statements with optimal conclusions and assumptions with the data and information given.	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	-	-	-
CO2	3	3	3	3	-	2	-	-	-	2	3	3	-	-	-
CO3	2	2	2	2	-	3	-	-	-	2	3	3	-	2	-
CO4	3	3	3	3	-	2	-	-	-	2	3	3	2	-	-
CO5	3	3	3	3	-	2	-	-	-	2	3	3	2	2	-
3 - Strong; 2 - Medium; 1 – Some															

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE(AIML)								
60 CG 0P3 - Career Skill Development III								
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.

*SDG 4 - Quality Education

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Logical Reasoning**	
1.1	Analogies - Alpha and numeric series	1
1.2	Number Series - Coding and Decoding	1
1.3	Blood Relations - Coded Relations	1
1.4	Order and Ranking – odd man out	1
1.5	Direction and distance	2
2.0	**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	1
2.5	Surds & indices	2
3.0	**Critical Reasoning**	
3.1	Syllogism	1
3.2	Statements and Conclusions, Cause and Effect	1
3.3	Statements and Assumptions	1
3.4	identifying Strong Arguments and Weak Arguments	1
3.5	Cause and Action -Data sufficiency	2
4.0	**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
5.0	**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)

1.R. Poovarasan - poovarasan@ksrct.ac.in

Passed in BoS Meeting held on 20/05/2023

Approved in Academic Council Meeting held on 03/06/2023 BoS Chairman Signature

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 2022 – 2023)

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 AM 001	Machine Learning Techniques	2	40	60	100	45	100
2	60 AM 501	Network Infrastructure	2	40	60	100	45	100
3	60 AM 502	Operating System	2	40	60	100	45	100
4	60 IT 003	Design Thinking	2	50	50	100	45	100
5	60 AM E1*	Professional Elective I	2	50	50	100	45	100
6	60 OE L2*	Open Elective II	2	40	60	100	45	100
PRACTICAL								
7	60 AM 0P1	Machine Learning Techniques Laboratory	3	60	40	100	45	100
8	60 AM 5P1	Network Infrastructure Laboratory	3	60	40	100	45	100
9	60 CG 0P4	Career Skill Development IV	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.

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM 001	Machine Learning Techniques	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To teach the theoretical foundations of various learning algorithms.
- To train the students better understand the context of supervised and unsupervised learning through real-life examples.
- To understand the need for Reinforcement learning in real – time problems.
- To apply all learning algorithms over appropriate real-time dataset.
- To evaluate the algorithms based on corresponding metrics identified.

Pre-requisites

- NIL

Course Outcomes

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

CO1	Comprehend, visualize, Analyse and preprocess the data from a real-time source.	Understand
CO2	Apply appropriate algorithm to the data.	Apply
CO3	Analyse the results of algorithm and convert to appropriate information required for the real – time application.	Analyse
CO4	Interpret the performance of various algorithms that could be applied to the data and to suggest most relevant algorithm according to the environment.	Analyse
CO5	Gain practical skills in using machine learning tools and libraries.	Remember

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	-
CO2	2	2	2	2	2	-	-	-	-	-	-	-	-	2	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO4	2	2	2	-	2	-	-	-	-	-	-	-	-	2	-
CO5	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	-	-	-
Understand	30	30	40
Apply	30	20	40
Analyse	-	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

Common to AIML, AI & DS

60 AM 001 – Machine Learning Techniques

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

Fundamentals of Machine Learning* Definitions - Classifications - Learning Paradigms - PAC learning - Version Spaces - Role of Machine Learning in Artificial Intelligence – Applications - Linear and Non-Linear Examples - Multi-Class & Multi-Label Classification - Linear Regression - Multiple Linear Regression.	[9]
Basic Supervised Learning Algorithms * Classification Algorithms: Decision Trees - K-NN Classifier – Regression & Classification: Logistic Regression - Perceptron (Single layer & Multi-layer).	[9]
Advanced Supervised Learning Algorithms** Support Vector Machines - Error Analysis and Metrics: Metrics & Error Correction - Advanced Decision Trees - Bias-Variance Tradeoff - Bagging and Boosting (Random forests, Adaboost, XG boost inclusive) - Ensemble method.	[9]
Advanced Machine Learning Techniques* Advanced Supervised Learning: Naïve Bayes Classifier - ID3 - CART - Error Bounds - Clustering Basics: Partitioned, Hierarchical and Density-based Clustering - K-Means Clustering - K-Mode Clustering - Self-organizing Maps - Expectation maximization - Dimensionality Reduction: Principal Component Analysis - Kernel PCA - t-SNE (t-distributed Stochastic Neighbor Embedding) - Metrics & Error Correction	[9]
Reinforcement Learning and Advanced Topics** Basics of Reinforcement Learning: Basic of RL - RL Framework - Markov Decision Process - Exploration vs. Exploitation - Policies - Exploration Strategies - Value Functions and Bellman Equations - Advanced Reinforcement Learning: Solution - Methods - Q-learning - Transfer Learning in RL - Safe Reinforcement Learning - Model Interpretability and Handling Data: Model Interpretability - Handling Missing Data - Metrics & Error Correction for Imbalanced Data - Ensemble Methods for Imbalanced Data - Ensemble Learning for Regression Problems.	[9]
Total Hours:	**45**

Text Book(s):

1.	Ethem Alpaydin,"Introduction to Machine Learning", MIT Press, Prentice Hall of India,Third Edition 2014
2.	Reinforcement Learning: An Introduction (Adaptive Computation and Machine Learning series) 2nd edition, Richard S. Sutton and Andrew G. Barto, A Bradford Book; 2018, ISBN 978-0262039246

Reference(s):

1.	Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar "Foundations of Machine Learning", MIT Press, 2012
2.	Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition,1997
3.	Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC Press, 2014.

*SDG 9 & 4 – Industry Innovation and Infrastructure & Quality Education

**SDG 11 – Sustainable Cities and Communities

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Fundamentals of Machine Learning**	
1.1	Definitions - Classifications	1
1.2	Learning Paradigms - PAC learning	1
1.3	Version Spaces	1
1.4	Role of Machine Learning in Artificial Intelligence	1
1.5	Applications	1
1.6	Linear and Non-Linear examples	1
1.7	Multi-Class & Multi-Label classification	1
1.8	Linear Regression	1
1.9	Multiple Linear Regression	1
2.0	**Basic Supervised Learning Algorithms**	
2.1	Classification Algorithms: Decision Trees	2
2.2	K-NN Classifier	2
2.3	Regression & Classification: Logistic Regression	2
2.4	Perceptron - Single layer	2
2.5	Perceptron - Multi-layer	1
3.0	**Advanced Supervised Learning Algorithms**	
3.1	Support Vector Machines	1
3.2	Error Analysis and Metrics: Metrics & Error Correction	2
3.3	Advanced Decision Trees	1
3.4	Bias-Variance Tradeoff	1
3.5	Bagging and Boosting (Random forests, Adaboost, XG boost inclusive)	2
3.6	Ensemble method	2
4.0	**Advanced Machine Learning Techniques**	
4.1	Advanced Supervised Learning: Naïve Bayes Classifier	1
4.2	ID3 – CART – Error bounds	1
4.3	Clustering Basics: Partitioned, Hierarchical, and Density-based Clustering	1
4.4	K-Means Clustering – K-Mode Clustering	1
4.5	Self-organizing Maps	1
4.6	Expectation maximization	1
4.7	Dimensionality Reduction: Principal Component Analysis	1
4.8	Kernel PCA – t-SNE (t-distributed stochastic neighbor embedding)	1
4.9	Metrics & Error Correction	1
5.0	**Reinforcement Learning and Advanced Topics**	
5.1	Basics of Reinforcement Learning: Basic of RL - RL Framework	1
5.2	Markov Decision Process - Exploration vs. Exploitation	1
5.3	Policies - Exploration Strategies	1
5.4	Value Functions and Bellman Equations	1
5.5	Advanced Reinforcement Learning: Solution - Methods	1
5.6	Q-learning - Transfer Learning in RL	1
5.7	Safe Reinforcement Learning - Model Interpretability and Handling Data: Model Interpretability	1
5.8	Handling Missing Data - Metrics & Error Correction for Imbalanced Data -	1
5.9	Ensemble Methods for Imbalanced Data - Ensemble Learning for Regression Problems	1

Course Designer(s)

1. R P Harshini – harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM 501	Network Infrastructure	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To build an understanding among students about the fundamental concepts of computer networking, protocols, architectures, and applications
- To help students to acquire knowledge in design, implement and Analyse performance of OSI and TCP-IP based Architectures
- To identify the suitable application layer protocols for specific applications and its respective security mechanisms

Pre-requisites

- NIL

Course Outcomes

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

CO1	Interpret the different building blocks of Communication network and its architecture.	Understand
CO2	Contrast different types of switching networks and analyse the performance of network.	Understand
CO3	Identify and analyse error and flow control mechanisms in data link layer.	Remember
CO4	Design sub-netting and analyse the performance of network layer with various routing protocols.	Apply
CO5	Compare various congestion control mechanisms and identify appropriate transport layer protocol for real time applications with appropriate security mechanism.	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	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	-	-	2	-	-	-	-	-	-	2	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	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	30	30	40
Understand	30	-	40
Apply	-	30	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM 501 - Network Infrastructure

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

Networking Principles and Layered Architecture* Data Communications and Networking: A Communications Model – Data Communications – Evolution of network, Requirements , Applications – Network Topology (Line configuration, Data Flow) – Protocols and Standards – Network Models (OSI, TCP/IP).	[9]
Circuit and Packet Switching** Switched Communications Networks – Circuit Switching – Packet Switching – Comparison of Circuit Switching and Packet Switching – Implementing Network Software, Networking Parameters (Transmission Impairment, Data Rate and Performance).	[9]
Data Link Layer** Error Detection and Correction – Hamming Code, CRC, Checksum – Flow control mechanism – Sliding Window Protocol – GoBack - N – Selective Repeat – Multiple access Aloha – Slotted Aloha – CSMA, CSMA/CD – IEEE Standards (IEEE802.3 (Ethernet), IEEE802.11 (WLAN)) – RFID – Bluetooth Standards.	[9]
Network Layer and Routing Protocols** IPV4 Address Space – Notations – Classful Addressing – Classless Addressing – Network Address Translation – IPv6 Address Structure – IPv4 and IPv6 header format – Routing-Link State and Distance Vector Routing Protocols –Implementation-Performance Analysis – Packet Tracer.	[9]
Transport Layer and Application layer*** TCP and UDP – Congestion Control – Effects of Congestion –Traffic Management –TCP Congestion Control – Congestion Avoidance Mechanisms – Queuing Mechanisms – QoS Parameters – Application layer – Domain Name System – Case Study: FTP – HTTP – SMTP - SNMP.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Behrouz A. Forouzan, “Data communication and Networking”, 5th Edition, 2017, McGraw Hill Education.
Reference(s):	
1.	James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach”, 6th Edition, 2017, Pearson Education.
2.	William Stallings, “Data and Computer Communication”, 10th Edition, 2017, Pearson, United Kingdom.

* SDG 4 – Quality Education

**SDG 9 – Industry Innovation and Infrastructure

***SDG 11 – Sustainable Cities and Communities

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Networking Principles and Layered Architecture**	
1.1	Networking Principles and Layered Architecture: Data Communications and Networking	2
1.2	A Communications Model	1
1.3	Data Communications	1
1.4	Evolution of network, Requirements , Applications	2
1.5	Network Topology (Line configuration,Data Flow)	1
1.6	Protocols and Standards	1
1.7	Network Models (OSI, TCP/IP)	1
2.0	**Circuit and Packet Switching**	
2.1	Circuit and Packet Switching: Switched Communications Networks	2
2.2	Circuit Switching	1
2.3	Packet Switching	1
2.4	Comparison of Circuit Switching and Packet Switching	2
2.5	Implementing Network Software	1
2.6	Networking Parameters,Transmission Impairment	1
2.7	Data Rate and Performance	1
3.0	**Data Link Layer**	
3.1	Data Link Layer: Error Detection and Correction	1
3.2	Hamming Code, CRC	1
3.3	Checksum, Flow control mechanism	1
3.4	Sliding Window Protocol	2
3.5	Selective Repeat, Multiple access	1
3.6	Aloha, Slotted Aloha	1
3.7	CSMA, CSMA/CD	1
3.8	IEEE Standards(IEEE802.3 (Ethernet), IEEE802.11(WLAN))	1
3.9	RFID, Bluetooth Standards	
4.0	**Network Layer and Routing Protocols**	
4.1	Network Layer: IPV4 Address Space	1
4.2	Notations	1
4.3	Classful Addressing, Classless Addressing	1
4.4	Network Address Translation	1
4.5	IPv6 Address Structure	1
4.6	IPv4 and IPv6 header format	1
4.7	Routing Protocols: Routing	1
4.8	Link State and Distance Vector Routing Protocols	1
4.9	Implementation, Performance Analysis, Packet Tracer	1
5.0	**Transport Layer and Application layer**	
5.1	Transport Layer: TCP and UDP	1
5.2	Congestion Control, Effects of Congestion	1
5.3	Traffic Management	1
5.4	TCP Congestion Control	1
5.5	Congestion Avoidance Mechanisms	1
5.6	Queuing Mechanisms, QoS Parameters	1
5.7	Application layer, Domain Name System	1
5.8	Case Study : FTP-HTTP	1
5.9	SMTP-SNMP	1

Course Designer(s)

1. R P HARSHINI - harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM 502	Operating System	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To introduce the operating system concepts, designs and provide skills required to implement the services
- To describe the trade-offs between conflicting objectives in large scale system design
- To understand different approaches to memory management.
- To Analyse and explain the algorithms used in Virtual Memory Management.
- To discuss the algorithms used in I/O and File Management.

Pre-requisites

- NIL

Course Outcomes

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

CO1	Acquire Knowledge on the basics of operating systems and its components	Understand
CO2	Examine the scheduling algorithms and critical section problem.	Apply
CO3	Acquire the knowledge of Deadlock and Storage Management	Understand
CO4	Outline the memory management scheme and File concept.	Understand
CO5	Analyse the concept of allocation methods, directory structure and free space management.	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	-	2	-	-	-	-	-	-	-	3	2	-
CO2	3	3	3	-	2	-	-	-	-	-	-	-	3	3	-
CO3	3	3	3	-	2	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	2	-	-	-	-	-	-	-	3	-	-
CO5	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	20	20	30
Understand	20	40	30
Apply	20	-	20
Analyse	-	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM 502 – Operating System

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 Concepts* Introduction to OS: Functionality of OS –Operating System Design Issues – Structuring Methods – System Calls – System Programs – Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication.	[9]
Process Management* Threads – Overview – Threading Issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling – The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic Problems of Synchronization – Monitors: Solution to Dining Philosophers Problem.	[9]
Deadlocks and Memory Management * Deadlocks – System Model – Deadlock Characterization – Methods for handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlocks – Main Memory–Storage Management – Swapping – Contiguous Memory Allocation – Paging – Segmentation – Structure of Page Table.	[9]
Virtual Memory and File Syatems* Virtual Memory – Demand Paging – Process Creation – Page Replacement – Allocation of Frames – Thrashing – File System Interface – File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection.	[9]
I/O Systems** File System Structure– File System Implementation – Directory Implementation – Allocation Methods – Free Space Management – Kernel I/O Subsystems – Disk Management – Disk Structure – Disk Scheduling – Swap Space Management.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Abraham Silberschatz., Peter B. Galvin, Greg Gagne, “Operating System Concepts”, 10th Edition, Wiley, United States, 2018.
Reference(s):	
1.	Andrew S. Tanenbaum, “Modern Operating Systems”, 4th Edition, Pearson, United Kingdom, 2018.
2.	William Stallings, “Operating Systems: Internals and Design Principles”, 9th Edition, Pearson, United Kingdom, 2018.

*SDG 9 & 4 – Industry Innovation and Infrastructure & Quality Education

**SDG 11 – Sustainable Cities and Communities

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Basic Concepts**	
1.1	Introduction to OS	1
1.2	Functionality of OS	1
1.3	Operating System Design Issues	1
1.4	Structuring Methods, Monolithic, Layered	1
1.5	System Calls	1
1.6	System Programs	1
1.7	Process Concept – Process Scheduling	1
1.8	Operations on Processes	1
1.9	Cooperating Processes – Inter-process Communication.	1
2.0	**Process Management**	
2.1	Threading Issues	1
2.2	CPU Scheduling	1
2.3	Basic Concepts – Scheduling Criteria	1
2.4	Scheduling Algorithms	1
2.5	Multiple-Processor Scheduling	2
2.6	Real Time Scheduling	1
2.7	The Critical-Section Problem and Synchronization Hardware	1
2.8	Classic Problems of Synchronization	1
2.9	Monitors: Solution to Dining Philosophers Problem.	
3.0	**Deadlocks and Memory Management**	
3.1	Deadlocks – System Model	1
3.2	Deadlock Characterization	1
3.3	Methods for handling Deadlocks	1
3.4	Deadlock Prevention	1
3.5	Deadlock Avoidance, Deadlock Detection	1
3.6	Storage Management	1
3.7	Swapping	1
3.8	Contiguous Memory Allocation	1
3.9	Paging – Segmentation – Structure of Page Table.	1
4.0	**Virtual Memory and File Syatems**	
4.1	Virtual Memory	1
4.2	Demand Paging	1
4.3	Page Replacement	1
4.4	Allocation of Frames	1
4.5	Thrashing	1
4.6	File System Interface – File Concept	1
4.7	Access Methods	1
4.8	Directory Structure – File System Mounting	1
4.9	File Sharing – Protection	1
5.0	**I/O Systems**	
5.1	File System Structure	1
5.2	File System Implementation	1
5.3	Directory Implementation	1
5.4	Allocation Methods	1
5.5	Free Space Management	1
5.6	Kernel I/O Subsystems	1
5.7	Disk Management – Disk Structure	1
5.8	Disk Scheduling	1
5.9	Swap Space Management.	1

Course Designer(s)

1. R P HARSHINI – harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

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	Analyse
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	20	-	-	-	-	-	-
Understand	40	-	30	-	-	60	-
Apply	-	50	20	50	50	40	50
Analyse	-	50	10	50	50	-	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
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]
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)	30

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

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.	
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.
2.	Designing for Growth: a design thinking tool kit for managers by Jeanne Liedtka and Tim Ogilvie.
3.	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation by Tim Brown.
Reference(s):	
1.	Johnny Schneider, "Understanding Design Thinking, Lean and Agile", O'Reilly Media, 2017.
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

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

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
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	2
4.3	Desirability Testing - How to conduct workshops	2
4.4	Requirements for the space	1
4.5	Material requirements	1
4.6	Agility for Design Thinking	2
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-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.	4

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

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
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 t`hey 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)

1. Mr.R. Arunkumar - rarunkumar@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM 0P1	Machine Learning Techniques Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To teach the theoretical foundations of various learning algorithms
- To evaluate the algorithms based on corresponding metrics identified
- To train the students better understand the context of supervised and unsupervised learning through real-life examples
- To apply all learning algorithms over appropriate real-time dataset
- To understand the need for Reinforcement learning in real-time problems

Pre-requisites

- NIL

Course Outcomes

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

CO1	Perceive, visualize, analyse and pre-process the data from a real-time source.	Apply
CO2	Apply appropriate algorithm to the data.	Apply
CO3	Analyse the results of algorithm and convert to appropriate information required for the real – time application.	Analyse
CO4	Analyse the performance of various algorithms that could be applied to the data.	Analyse
CO5	Propose the most suitable algorithm based on the specific context and 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	3	2	-	3	3	-	-	-	-	-	-	-	-	3	-
CO2	3	2	-	3	3	-	-	-	-	-	-	-	-	3	-
CO3	3	2	3	3	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	3	3	3	-	-	-	-	-	-	-	-	3	-
CO5	3	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	-	-	-	-	-
Apply	25	12	50		50
Analyse	25	13	50		50
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to AIML, AI & DS								
60 AM 0P1 – Machine Learning Techniques 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. Implementation for Linear Regression
2. Viewing and Tweaking our Decision Tree
3. K-Nearest Neighbor Algorithm
4. Logistic regression
5. Support Vector Machines – Linear & Non-linear***
6. Evaluation Metrics for Regression Tasks
7. Principal Component Analysis
8. Bias-Variance Tradeoff
9. Preprocessing & Pipelines Logistic regression

Lab Manual	
1.	"ML Techniques Lab Manual", Department of CSE (AIML), KSRCT.

*SDG 9 – Industry Innovation and Infrastructure
**SDG 3 – Good Health and Well Being
***SDG 11 – Sustainable Cities and Communities

Course Designer(s)

1. V.Thamizharasu – thamizharasu@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM 5P1	Network Infrastructure Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To build an understanding among students about the fundamental concepts of computer networking, protocols, architectures, and applications
- To help students to acquire knowledge in design, implement and analyse performance of OSI and TCP-IP based Architectures
- To identify the suitable application layer protocols for specific applications and its respective security mechanisms

Pre-requisites

- Nil

Course Outcomes

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

CO1	Interpret the different building blocks of Communication network and its architecture.	Apply
CO2	Contrast different types of switching networks and analyse the performance of network.	Apply
CO3	Identify and analyse error and flow control mechanisms in data link layer.	Analyse
CO4	Design sub-netting and analyse the performance of network layer with various routing protocols.	Analyse
CO5	Compare various congestion control mechanisms and identify appropriate transport layer protocol for real time applications with appropriate security mechanism.	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	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	2	-	-	3	-	-	-	-	-	-	-	2	-	-
CO4	2	3	-	-	3	-	-	-	-	-	-	-	2	-	-
CO5	2	3	-	-	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	25	12	50		50
Analyse	25	13	50		50
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM 5P1 – Network Infrastructure 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. Study of Basic Network Commands, Demo session of all networking hardware and Functionalities*
2. Error detection and correction mechanisms**
3. Flow control mechanisms
4. IP addressing Classless addressing
5. Observing Packets across the network and Performance Analysis of Routing protocols***
6. Socket programming (TCP and UDP)
7. Simulation of unicast routing protocols

Design Experiments:

1. Simulation of Transport Layer Protocols and analysis of congestion control techniques in network
2. Develop a DNS client server to resolve the given host name or IP address

Lab Manual	
1.	"Network Infrastructure Lab Manual", Department of Mechanical Engineering, KSRCT.

*SDG 9 – Industry Innovation and Infrastructure
**SDG 4 – Quality Education
***SDG 11 – Sustainable Cities and Communities

Course Designer(s)

1. V Thamizharasu – thamizharasu@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 CG 0P4	Career Skill Development IV	Category	L	T	P	Credit
		CS	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 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.	Analyse
CO2	Identify cause and effects in events, industrial processes through technical texts	Analyse
CO3	Analyse problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Analyse
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	3	-
CO2	-	-	-	-	-	-	-	2	3	3	2	3	2	3	-
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	2	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	2	3	-
CO5	-	-	-	-	-	-	-	2	3	3	2	3	2	3	-
3 - Strong; 2 - Medium; 1 – Some															

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
60 CG 0P4 - Career Skill Development IV								
Common to All Branches								
Semester	**Hours/Week**			**Total Hours**	**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**

Text Book(s):	
1.	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..
2.	Crouse W. H., and Anglin D. L., “Automotive Mechanics”, 10th Edition, McGraw Hill Education Private Limited, New Delhi, 2017.
Reference(s):	
1.	Martin W, Stockel and Martin T Stockle, “Automotive Mechanics Fundamentals”, The Good Heart – Will Cox Company Inc, USA, 2012.
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 9 – Industry Innovation and Infrastructure
**SDG 3 – Good Health and Well Being
***SDG 7 – Affordable and Clean Energy

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.**0**	Verbal & Analytical Reasoning	
1.1	Seating Arrangements 1 1.2 Analytical Reasoning (PUZZELS)	1
1.2	Machine input and output	1
1.3	Coded Inequality	1
1.4	Eligibility Test	1
1.5	Vehicle Aerodynamics	2
2.0	Quantitative Aptitude - Part – 4	
2.1	Permutation and Combination	1
2.2	Probability	1
2.3	Quadratic equation – Geometry	1
2.4	Clock – Calendar	1
2.5	Logarithmic	2
3.0	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
4.0	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
5.0	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(s)

1. R. Poovarasan - poovarasan@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

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 2022 - 2023)

SIXTH 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 AM 601	Visual Analytics in AI	2	40	60	100	45	100
3	60 AM 602	Deep Learning	2	40	60	100	45	100
4	60 AM 603	Web Technology	2	40	60	100	45	100
5	60 AM E2*	Professional Elective II	2	50	50	100	45	100
6	60 OE L3*	Open Elective III	2	40	60	100	45	100
PRACTICAL								
7	60 AM 6P1	Visual Analytics in AI Laboratory	3	60	40	100	45	100
8	60 AM 6P2	Deep Learning Laboratory	3	60	40	100	45	100
9	60 AM 6P3	Mini Project	3	100	-	100	-	100
10	60 CG 0P5	Comprehensive Test	1	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 Semeter Examination, 50 marks for theory cum practical End Semester Examination and 40 marks for practical End Semester Examination.

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

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	Understand the basic concepts of economics, demand, supply, and market structure	Understand
CO2	Understand the forms of business organization and functions of commercial and central bank	Understand
CO3	Understand the basis of financial accounting and capital budgeting techniques	Understand
CO4	Apply different types of pricing strategies and comprehensive project feasibility in diverse business	Apply
CO5	Apply 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	3
CO2	-	-	-	-	-	2	2	-	-	-	3	3	-	3	-
CO3	-	-	2	3	-	-	-	-	-	-	3	-	2	2	-
CO4	2	-	-	3	-	2	-	-	-	-	-	3	3	3	2
CO5	3	3	3	3	-	-	2	2	-	-	2	2	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	30	25	35
Understand	30	25	45
Apply	-	10	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

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
VI	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 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]
Cost Analysis 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]
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

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**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	**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
2.8	Short Term Borrowing, Long Term Borrowing	1
2.9	Internal Generation of Funds, External Commercial Borrowings	1
3	**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	**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	**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

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM 601	Visual Analytics in AI	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand techniques for creating effective visualizations based on principles from graphic design.
- To understand algorithms for creating effective visualizations.
- To learn several industry-standard software tools to create a compelling.
- To understand the interactive visualization of various types of data.
- To apply graph visualization and navigation techniques.

Pre-requisites

- NIL

Course Outcomes

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

CO1	Gain insight into the fundamental techniques and theory of visualization, covering data models, graphical perception, and approaches to visual encoding and interaction.	Understand
CO2	Acquire knowledge on graphics pipeline and graphical perception.	Remember
CO3	Create the graphical design and heat map.	Apply
CO4	Analyse multidimensional data.	Analyse
CO5	Apply graph visualization and navigation.	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	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	3	2	3	2	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	3	3	3	-	-	-	-	-	-	-	-	3	-
CO5	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	30	-	20
Understand	30	20	30
Apply	-	30	40
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM 601- Visual Analytics in 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 Data for Graphics, Design principles, Value for visualization, Categorical, time series, and statistical data graphics, Introduction to Visualization Tools	[9]
Graphics Pipeline and Aesthetics and Perception Introduction, Primitives: vertices, edges, triangles, Model transforms: translations, rotations, scaling, View transform, Perspective transform, window transform, Graphical Perception Theory, Experimentation, and the Application, Graphical Integrity, Layering and Separation, Color and Information, Using Space	[9]
Visualization Design Visual Display of Quantitative Information, Data-Ink Maximization, Graphical Design, Exploratory Data Analysis, Heat Map	[9]
Multidimensional Data and Interaction Query, Analysis and Visualization of Multi-Dimensional Relational Databases, Interactive Exploration, tSNE, Interactive Dynamics for Visual Analysis, Visual Queries, Finding Patterns in Time Series Data, Trend visualization, Animation, Dashboard, Visual Storytelling	[9]
Collaboration Graph Visualization and Navigation, Online Social Networks, Social Data Analysis, Collaborative Visual Analytics, Text, Map, Geospatial data	[9]
Total Hours:	**45**

Text Book(s):	
1.	E. Tufte – “The Visual Display of Quantitative Information” - Graphics Press - 2nd Edition, 2001
2.	Jeeva Jose – “Beginner’s Guide for Data Analysis using R Programming” - Khanna Publishing – 2019
Reference(s):	
1.	J. Koponen, J. Hildén – “Data Visualization Handbook” – CRC Press – 2019
2.	M. Lima – “The Book of Trees: Visualizing Branches of Knowledge” – Princeton Architectural Press – 2014
3.	R. Tamassia - “Handbook of Graph Drawing and Visualization” – CRC Press – 2013
4.	S. Murray O' – “Interactive Data Visualization for the Web by” - 2nd Edition – 2017

*SDG 9 – Industry, Innovation and Design

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Introduction**	
1.1	Data for Graphics	1
1.2	Design principles	1
1.3	Value for visualization	1
1.4	Categorical	1
1.5	time series	1
1.6	statistical data graphics	2
1.7	Introduction to Visualization Tools	2
2	**Graphics Pipeline and Aesthetics and Perception**	
2.1	Introduction	1
2.2	Primitives: vertices, edges, triangles	1
2.3	Model transforms: translations, rotations, scaling,	1
2.4	View transform	1
2.5	Perspective transform	1
2.6	window transform	1
2.7	Graphical Perception Theory	1
2.8	Experimentation and the Application	1
2.9	Graphical Integrity	1
3	**Visualization Design**	
3.1	Visual Display of Quantitative Information	1
3.2	Data-Ink Maximization	2
3.3	Graphical Design	2
3.4	Exploratory Data Analysis	2
3.5	Heat Map	2
4	**Multidimensional Data and Interaction**	
4.1	Query	1
4.2	Analysis and Visualization of Multi-Dimensional Relational Databases	1
4.3	Interactive Exploration	1
4.4	tSNE - Interactive Dynamics for Visual Analysis	1
4.5	Visual Queries	1
4.6	Finding Patterns in Time Series Data	1
4.7	Trend visualization – Animation	1
4.8	Dashboard	1
4.9	Visual Storytelling	1
5	**Collaboration**	
5.1	Graph Visualization and Navigation	2
5.2	Online Social Networks	1
5.3	Social Data Analysis	1
5.4	Collaborative Visual Analytics	1
5.5	Text	1
5.6	Map	1
5.7	Geospatial data	2

Course Designer(s)

1. Mr.P.Thangamariappan – thangamariappan@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM 602	Deep Learning	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To introduce the fundamentals of deep learning and the main research activities in this field.
- To learn architectures and optimization methods for deep neural network training.
- To implement and learn various algorithm and test it using tensor flow tool.
- To construct new application using tensor flow tool.
- To learn various applications of Deep Learning.

Pre-requisites

- Basic Knowledge of Machine Learning

Course Outcomes

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

CO1	Comprehend the fundamentals of deep learning and the main research activities in this field.	Understand
CO2	Acquire Knowledge on architectures and optimization methods for deep neural network training.	Remember
CO3	Implement, apply and test relevant learning algorithms in Tensor Flow.	Apply
CO4	Critically evaluate the method's applicability in new contexts and construct new applications.	Apply
CO5	Acquire knowledge on various application of Deep Learning.	Remember

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	-
CO2	3	2	-	3	2	-	-	-	-	-	-	-	-	3	-
CO3	3	2	-	3	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	3	3	-	-	-	-	-	-	-	-	3	-
CO5	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	30	-	20
Understand	30	20	40
Apply	-	40	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E. CSE (Artificial Intelligence and Machine Learning)								
60 AM 602- Deep Learning								
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* History of Deep Learning, McCulloch Pitts Neuron, Multilayer Perceptrons (MLPs), Representation Power of MLPs, Sigmoid Neurons, Feed Forward Neural Networks, Back propagation.	[9]
Activation functions and parameters* Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, Principal Component Analysis and its interpretations, Singular Value Decomposition, Parameters v/s Hyper-parameters.	[9]
Auto-encoders & Regularization * Auto encoders and relation to PCA, Regularization in auto encoders, Denoising auto encoders, Sparse auto encoders, Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Encoder Decoder Models, Attention Mechanism, Attention over images, Batch Normalization.	[9]
Deep Learning Models * Introduction to CNNs, Architecture, Convolution/pooling layers, CNN Applications, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet. Introduction to RNNs, Back propagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs.	[9]
Deep Learning Applications** Image Processing, Natural Language Processing, Speech recognition, Video Analytics.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Ian Goodfellow, YoshuaBengio, Aaron Courville. Deep Learning, the MIT press, 2016.
2.	Bengio, Yoshua. "Learning deep architectures for AI." Foundations and trends in Machine Learning 2.1, Now Publishers, 2009.
Reference(s):	
1.	Deep Learning, Rajiv Chopra, Khanna Book Publishing, Delhi 2020.
2.	https://www.coursera.org/specializations/deep-learning
3.	Graves, A., Wayne, G. & Danihelka, I. Neural Turing machines. http://arxiv.org/ abs/1410.5401 (2014)
4.	T. Kautz, B. H. Groh, J. Hannink, U. Jensen, H. Strubberg, and B. M. Eskofier, “Activity recognition in beach volleyball using a DEEp Convolutional Neural NETwork: leveraging the potential of DEEp Learning in sports,” Data Mining and Knowledge Discovery, vol. 31, no. 6, pp. 1678–1705, 2017.

*SDG 9 – Industry Innovation and Infrastructure

**SDG 3 – Good Health and Well Being

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Introduction**	
1.1	History of Deep Learning	1
1.2	McCulloch Pitts Neuron	1
1.3	Multilayer Perceptrons (MLPs)	1
1.4	Representation Power of MLPs	2
1.5	Sigmoid Neurons	2
1.6	Feed Forward Neural Networks, Back propagation	2
2	**Activation functions and parameters**	
2.1	Gradient Descent (GD)	2
2.2	Momentum Based GD	2
2.3	Nesterov Accelerated GD	1
2.4	Stochastic GD, Principal Component Analysis and its interpretations	2
2.5	Singular Value Decomposition	1
2.6	Parameters v/s Hyper-parameters	1
3	**Auto-Encoders & Regularization**	
3.1	Auto Encoders and relation to PCA	1
3.2	Regularization in auto encoders, Denoising auto encoders	2
3.3	Sparse auto encoders, Regularization: Bias Variance Tradeoff, L2 regularization	2
3.4	Early stopping, Dataset augmentation	1
3.5	Encoder Decoder Models, Attention Mechanism	2
3.6	Attention Over images, Batch Normalization	1
4	**Deep Learning Models**	
4.1	Introduction to CNNs, Architecture	1
4.2	Convolution/pooling layers	1
4.3	CNN Applications, LeNet	1
4.4	AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet. Introduction to RNNs	1
4.5	Back propagation through time (BPTT)	1
4.6	Vanishing and Exploding Gradients	1
4.7	Truncated BPTT	1
4.8	GRU, LSTMs	2
5	**Deep Learning Applications**	
5.1	Image Processing	3
5.2	Natural Language Processing	2
5.3	Speech recognition	2
5.4	Video Analytics	2

Course Designer(s)

1. Ms.T.Subbulakshmi - subbulakshmi@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM 603	Web Technology	Category	L	T	P	Credit
		PC	1	0	4	3

Objectives

- To Enable the students to learn basic web concepts
- To learn the concepts of scripting languages and server side programming
- To apply the features of XML and JDBC Connectivity
- To Write scripts in JSP and Angular JS
- To make aware of the students about development in web technologies

Prerequisite

- NIL

Course Outcomes

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

CO1	Outline the features of HTML and employ various style sheet concepts within HTML.	Understand
CO2	Apply the basics concepts of JavaScript and express various types' events.	Apply
CO3	Analyzing the concepts of XML and JDBC.	Analyse
CO4	Gain the knowledge of JSP in server side programming and deploy the features of Angular JS with the various effects of elements and events.	Apply
CO5	Develop the diverse types of applications based on their functionalities and characteristics.	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	-	-	-	-	-	-	-	3	-	-
CO2	3	2	-	-	3	-	-	-	-	-	-	-	3	-	-
CO3	3	2	-	-	3	-	-	-	-	-	-	-	3	-	-
CO4	3	2	2	-	3	-	-	-	-	-	-	-	3	-	-
CO5	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)
	1	2		
Remember	30	-	30	-
Understand	-	-	-	-
Apply	30	40	40	50
Analyse	-	20	20	50
Evaluate	-	-	-	-
Create	-	-	10	-
Total	60	60	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E- CSE (Artificial Intelligence and Machine Learning)								
60 AM 603- Web Technology								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	1	0	4	75	3	50	50	100

Introduction* Internet Basic - Introduction to HTML - List - Creating Table - Linking document - Frames - Graphics to HTML Doc - Style sheet - Style sheet basic - Add style to document - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties.	[3+12]
Javascript* Introduction to Javascript - Advantage of Javascript - Javascript Syntax - Datatype - Variable - Array - Operator and Expression - Looping Constructor - Function - Dialog box – Events.	[3+12]
XML and JDBC* Features of XML, The XML Declaration, Element Tags - Nesting and structure, XML text and text formatting element, Table element, Mark-up Element and Attributes, Document Type Definition (DTD),.XML Schema-Introduction - JDBC Architecture - Types of Drivers – Statement - Result Set - Prepared Statement - Connection Modes – Save Point - Batch Updations - Callable Statement.	[3+12]
JSP and Angular JS* JSP LifeCycle - JSP Directives: page, include, taglib - Jsp Scripting Elements: declaratives, scriptlets - JSP Actions. Introduction to Angular JS, JSON -HTML and Bootstrap CSS Primer - JavaScript Primer - Single Page Application – MVC Architecture – first Application of AngularJS - Binding – Template Directives – Elements – Events.	[3+12]
Applications * e-Business Models – Building an e-Business – e-Marketing – Database connectivity – Online Payments – Security - XML and e-Commerce – m-Business.	[3+12]
Total Hours:	**75**

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, 2015.
2.	Haggit Attiya and Jennifer Welch, —Distributed Computing – Fundamentals, Simulations and Advanced Topics‖, Second Edition, Wiley, 2016.
Reference(s):	
1.	D.Norton and H. Schildt, "Java 2: The complete Reference", TMH,2016.
2.	Eric Ladd and Jim O'Donnell, et al, "USING HTML 4, XML, and JAVA1.2", PHI publications, 2015.
3.	Jeffy Dwight, Michael Erwin and Robert Nikes "USING CGI", PHI Publications, 2016.
4.	Ken Williamson," Learning AngularJS: A Guide to AngularJS Development", O'Reilly,2017.

***SDG 4 – Quality Education**

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Introduction**	
1.1	Internet Basic ,Introduction to HTML , List , Creating Table , Linking document	1
1.2	Frames , Graphics to HTML Doc , Style sheet , Style sheet basic , Add style to document	1
1.3	Creating Style sheet rules , Style sheet properties , Font , Text , List, Color and background color , Box - Display properties.	1
2	**Java Script**	
2.1	Introduction to Javascript , Advantage of Javascript , Javascript Syntax	1
2.2	Datatype , Variable , Array , Operator and Expression , Looping Constructor	1
2.3	Function , Dialog box, Events.	1
3	**XML and JDBC**	
3.1	Features of XML, The XML Declaration, Element Tags, Nesting and structure	1
3.2	XML text and text formatting element, Table element, Mark-up Element and Attributes	1
3.3	Document Type Definition (DTD),.XML Schema-Introduction, JDBC Architecture-Types of Driver	1
3.4	Statement-Result Set-Prepared Statement, Connection Modes-SavePoint-Batch Updations, Callable Statement	
4	**JSP and Angular JS**	
4.1	JSP LifeCycle, JSP Directives: page, include, taglib, Jsp Scripting Elements: declaratives, scriptlet, JSP Actions	1
4.2	Introduction to Angular JS, JSON, HTML and Bootstrap CSS Primer , JavaScript Primer , Single Page Application	1
4.3	MVC Architecture , first Application of AngularJS, Binding , Template Directives , Elements , Events.	1
5	**Applications**	
5.1	e-Business Models – Building an e-Business – e-Marketing	1
5.2	Database connectivity – Online Payments – Security	1
5.3	XML and e-Commerce – m-Business	1
6	**Project**	
6.1	Problem Identification	10
6.2	Solution for Problem	15
6.3	Implementation	20
6.4	Presentation	05
6.5	Report	05
6.6	Demo	05

Course Designer(s)

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

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM 6P1	Visual Analytics in AI Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To Familiarize Students with Essential Data Visualization Tools and libraries in Python, such as Matplotlib, Seaborn, Plotly, Tableau and Power BI, enabling them to effectively explore and communicate insights from data
- To Equip students with the skills to create a wide range of visualizations, from basic plots like line, scatter and bar plots to advanced techniques such as subplots, 3D plots, and interactive visualizations
- To Enhance Understanding of Statistical Data Visualization concepts and techniques, empowering them to Analyse and interpret complex datasets through visualization
- To Enable students to customize visualizations by exploring options such as color schemes, labels, titles, annotations and interactivity
- To Provide students with hands-on experience through practical exercises and projects, allowing them to apply theoretical concepts learned in the classroom to real-world datasets and scenarios

Pre-requisites

NIL

Course Outcomes

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

CO1	Apply visualization techniques across different domains.	Apply
CO2	Utilize advanced customization options in visualization tools.	Apply
CO3	Create innovative and visually appealing visualizations.	Apply
CO4	Design interactive dashboards for data exploration.	Apply
CO5	Analyse trends, patterns and relationships within datasets.	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	-	3	-	-	-	-	-	-	-	-	3	-
CO2	2	-	2	2	3	-	-	-	-	-	-	-	-	3	-
CO3	2	-	2	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	-	2	3	3	-	-	-	-	-	-	-	-	3	-
CO5	3	-	2	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	-	-	-	-	-
Apply	40	15	70	-	70
Analyse	10	10	30	-	30
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM 6P1 – Visual Analytics in AI 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. **Visualization using Matplotlib in Python***
   Understand how to create and customize line, scatter, and bar plots with Matplotlib, including colors, labels, titles, annotations, and text.
2. **Advanced Visualization using Matplotlib in Python**
   Explore subplots and multiple axes for complex visualizations, create 3D and surface plots, and implement interactive features like zooming and panning.
3. **Visualization using Seaborn in Python**
   Understand to create visually appealing statistical plots such as scatter plots, pair plots, and box plots, explore Seaborn's built-in themes and styling options, and practice using Seaborn to visualize relationships between variables in datasets.
4. **Advanced Visualization using Seaborn in Python**
   Explore categorical plots like bar plots, violin plots, and swarm plots, learn to create heatmaps and clustermaps for exploring correlations in datasets, and practice customizing Seaborn plots with color palettes, grid styles, and figure aesthetics.
5. **Interactive Visualization using Plotly in Python**
   Gain proficiency in creating interactive line plots, scatter plots, and bubble charts, explore Plotly's interactive features like hover tooltips and zooming, and practice adding interactivity to plots with dropdown menus and sliders.
6. **Geospatial Visualization using Plotly in Python**
   Acquire the skills to plot geographical data on maps using Plotly's mapping functionality, experiment with choropleth maps to visualize spatial distributions of data, and practice adding layers, markers, and annotations to geospatial plots.
7. **Visualization using Tableau**
   Acquire proficiency in connecting to data sources and importing datasets into Tableau, explore its drag-and-drop interface for visualization creation, and practice building interactive dashboards with filters, parameters, and actions.
8. **Visualization using Power BI**
   Acquire structured learning by mastering data import into Power BI Desktop, experimenting with diverse visualization types, and practicing interactive report and dashboard creation with features like slicers, drill-through, and bookmarks, spanning from basic plotting with Matplotlib to advanced visualizations with Plotly, Tableau, and Power BI.

Lab Manual

1.	"Visual Analytics Lab Manual", Department of CSE(AIML), KSRCT.

*SDG 9 – Industry Innovation and Infrastructure

Course Designer(s)

1. R P HARSHINI – harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM 6P2	Deep Learning Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To introduce the fundamentals of deep learning and the main research activities in this field
- To learn architectures and optimization methods for deep neural network training
- To Apply Dimensionality Reduction Techniques
- To understand their impact on the convergence and efficiency of neural network training
- To implement Deep Learning Models
- To become proficiency in implementing Neural Network Applications

Pre-requisites

- Basic knowledge of Machine Learning Concepts.

Course Outcomes

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

CO1	Apply MLP, Feed Forward Neural Networks with Sigmoid Neurons and Backpropagation in deep learning framework sinteraction	Apply
CO2	Analyse the impact of activation functions (sigmoid, tanh, ReLU) in MLPs and influence of hyper parameters on reconstruction accuracy and model generalization	Analyse
CO3	Analyse the impact of regularization techniques on auto-encoder models	Analyse
CO4	Apply and test relevant learning algorithms in Tensor Flow	Apply
CO5	Analyse the method's applicability in new contexts and construct new 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	2	-	-	3	-	-	-	-	-	-	-	-	3	-
CO2	3	2	-	-	3	-	-	-	-	-	-	-	-	3	-
CO3	3	2	-	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	-	3	-	-	-	-	-	-	-	-	3	-
CO5	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

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM 6P2 – Deep Learning 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. Implement a basic MLP model using a deep learning framework. *
2. Construct a Feed Forward Neural Network (FFNN) using Sigmoid Neurons.
3. Implement Back propagation to train a simple neural network.
4. Investigate the impact of activation functions including sigmoid, tanh, and ReLU on MLPs.
5. Evaluate the impact of each hyper parameter on reconstruction accuracy and model generalization
6. Implement a sparse auto-encoder architecture using a deep learning framework using Tensor Flow or PyTorch.
7. Implement and Analyse the impact of various regularization techniques on auto-encoder models.
8. Implementation of Convolution Neural Network in Python using Tensor Flow. *

Design Experiments:

1. Implementation of Long Short-Term Memory (LSTM) in Python using Tensor Flow.
2. Mini Project work involving the application of Deep Learning.

Lab Manual	
1.	"Deep Learning Lab Manual", Department of CSE (AIML), KSRCT.

*SDG 4 – Quality Education

Course Designer(s)

1. Dr. P. KALADEVI – kaladevi@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM 6P3	Mini Project	Category	L	T	P	Credit
		PC	0	0	2	1*

Objectives

- To develop their own innovative prototype of ideas
- To find solution by formulating proper methodology
- To inculcate innovative thinking and thereby preparing students for main project

Pre-requisites

- Nil

Course Outcomes

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

CO1	Analyse a problem in the domain of interest.	Analyse
CO2	Perform Literature survey and identify the existing issues.	Apply
CO3	Rank the possible solutions.	Apply
CO4	Implement the project by Identify tools and techniques.	Analyse
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	2	3	3	1	2	-	-	1	2	3	1	3	2	-
CO2	1	3	1	2	3	2	-	-	1	2	3	3	3	2	-
CO3	2	3	1	2	3	2	-	-	1	2	3	2	3	2	-
CO4	2	3	2	2	3	2	-	-	1	2	3	3	3	2	-
CO5	2	3	3	2	3	2	-	-	1	2	3	1	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	25	-	50	-
Analyse	25	-	50	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	-

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM 6P3 – Mini Project								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	0	0	2	30	1*	100	-	100

List of Experiments:

1. Three reviews have to be conducted by the committee of minimum of three members one of which should be guide*
2. Problem should be Identified and Selected *
3. Students have to collect about 20 papers related to their work *
4. Application can be developed *
5. Reports has to be Prepared by the Students as per the format in Annexure-1 and suggested for various conference Publication*
6. Internal evaluation has to be done for 100 Marks

*SDG 4 – Quality Education

Course Designer(s)

1. Dr.C.Rajan – rajan@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 CG 0P5	Comprehension Test *	Category	L	T	P	Credit
		CG	0	0	2	1*

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.

Pre-requisites

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

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

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 2022 - 2023)

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 AM 701	Machine vision	2	40	60	100	45	100
2	60 AM 702	Speech and Language Processing	2	40	60	100	45	100
3	60 AM 703	Explainable AI	2	40	60	100	45	100
4	60 AM E3*	Professional Elective III	2	40	60	100	45	100
5	60 AM E4*	Professional Elective IV	2	50	50	100	45	100
6	60 AC 001	Research Skill Development	2	100	-	100	-	-
7	60 AB 00*	NCC/NSS/NSO/YRC/RRC/Fine Arts*	-	50	50	100	45	100
PRACTICAL								
8	60 AM 7P1	Machine vision Laboratory	3	60	40	100	45	100
9	60 AM 7P2	Speech and Language Processing Laboratory	3	60	40	100	45	100
10	60 AM 7P3	Project Work – Phase I	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, 50 marks for theory cum practical End Semester Examination and 40 marks for practical End Semester Examination.

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM 701	Machine Vision	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To enhance and restore the images acquired from cameras
- To educate in taking the individual steps that leads to final inspection result based on the acquired image data
- To Analyse the real-world problems and provide solutions to automated visual inspection
- To Apply statistical methods for analyzing and describing the texture of images using features.
- To educate the stereo images can be used to compute depth information and reconstruct 3D scenes.

Pre-requisites

- Basic Knowledge of Machine Learning and Visulaization techniques

Course Outcomes

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

CO1	Explore the fundamentals of how an image is processed.	Understand
CO2	Enhance, Analyse and segment the image using algorithms.	Apply
CO3	Interpret the image and apply mathematical principles to transform it.	Apply
CO4	Extract the features from the image and represent using morphological operations.	Apply
CO5	Apply the concept in understanding the scene and process the background part of the image.	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	-
CO2	3	2	2	-	3	-	-	-			-	-	-	3	-
CO3	3	2	3	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	2	3	3	-	-	-			-	-	-	3	-
CO5	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	30
Understand	20	20	30
Apply	30	30	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Artificial Intelligence and Machine Learning

60 AM 701- Machine Vision

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

Basics of Image Processing* Image Formation Physics – Image Digitization – Sampling and Quantization – Digital Image Properties, Color Images, Color spaces/ conversions, Cameras.	[9]
Preprocessing and Image Enhancement** Image Enhancement Methods: Contrast Adjustment – Histogram Manipulation – Image Smoothening – Image Sharpening; Image Enhancement using Linear Filters – Ideal Low Pass Filter – Gaussian Filter – Filtering Thresholding - Edge Detection- Edge Based Segmentation – Region Based Segmentation.	[9]
Image Analysis and Segmentation* Thresholding – Edge Detection – Edge Based Segmentation – Region Based Segmentation Active Contour Models – Graph Based Segmentation – Image Analysis– invariant feature – Image transforms.	[9]
Mathematical Morphology and Texture Description Image Invariant feature* Skeletons and object marking – Morphological Segmentation – Statistical Texture Description – Co-occurrence matrices – Local Binary Patterns – Syntactic Texture Description Methods – Object Measurement – Counting – Visual inspection tasks regarding Textures.	[9]
Motion Analysis and Scene Analysis** Optical Flow – Detection and Correspondence of Interest Points – Detection of Motion Patterns – Video Tracking – Motion Models To Aid Tracking: Kalman Filters – Stereo Mapping – Image Fusion – Detection of Known Objects By Linear Filters – Detection Of Unknown Objects –The Hough Transform For The Detection of Lines – Corner Detection – Image Tagging.	[9]
Total Hours:	**45**

Text Book(s):

1.	Milan Sonka, Vaclav Hlavac, Roger Boyle, “Image Processing, Analysis, and Machine Vision”, 4th Edition, Cengage Learning, USA
2.	Jurgen Beyerer, Fernando Puente Leon, Christian Frese,” Machine Vision Automated Visual Inspection: Theory, Practice and Applications”, 2016, Springer
3.	Al Bovik, “The Essential Guide to Image Processing”, 2009, Academic Press

Reference(s):

1.	Oge Marques, Practical Image and Video Processing using MATLAB, IEEE Press, Wiley Publications

*SDG 9 – Industry Innovation and Infrastructure

**SDG 4 – Quality Education

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Basics of Image Processing**	
1.1	Image Formation Physics	1
1.2	Image Digitization	1
1.3	Sampling and Quantization	1
1.4	Digital Image Properties	2
1.5	Color Images	1
1.6	Color spaces/ conversions, Cameras	3
2.0	**Pre-processing and Image Enhancement**	
2.1	Image enhancement methods: Contrast Adjustment	2
2.2	Histogram Manipulation	1
2.3	Image Smoothening, Image Sharpening	1
2.4	Image Enhancement using Linear Filters	1
2.5	Ideal Low Pass Filter, Gaussian Filter	1
2.6	Filtering Thresholding	1
2.7	Edge detection, Edge Based Segmentation	1
2.8	Region Based Segmentation	1
3.0	**Image Analysis and Segmentation**	
3.1	Thresholding	1
3.2	Edge detection	1
3.3	Edge Based Segmentation	1
3.4	Region Based Segmentation Active Contour Models	2
3.5	Graph Based segmentation	1
3.6	Image Analysis,	1
3.7	Invariant feature	1
3.8	Image transforms	1
4.0	**Mathematical Morphology and Texture Description Image Invariant feature**	
4.1	Skeletons and object marking	1
4.2	Morphological Segmentation	1
4.3	Statistical Texture Description	1
4.4	Co-occurrence matrices	1
4.5	Local Binary Patterns	1
4.6	Syntactic Texture Description Methods	1
4.7	Object Measurement	1
4.8	Counting	1
4.9	Visual inspection tasks regarding textures	1
5.0	**Motion Analysis and Scene Analysis**	
5.1	Optical Flow	1
5.2	Detection and Correspondence of Interest Points	1
5.3	Detection of Motion Patterns	1
5.4	Video Tracking	1
5.5	Motion Models to aid tracking: Kalman Filters	1
5.6	stereo mapping, image fusion	1
5.7	Detection of known objects by linear filters	1
5.8	Detection of unknown objects, The Hough transform for the detection of lines	1
5.9	Corner detection - image tagging	1

Course Designer(s)

1. R P HARSHINI – harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM 702	Speech and Language Processing	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To be competent with fundamental concepts of natural language processing.
- To be competent with fundamental concepts of automatic speech recognition.
- To understand technologies involved in developing speech and language applications.
- To demonstrate the use of deep learning for building applications in speech and natural language processing
- To acquire knowledge on various models in text analysis.

Pre-requisites

- Basic Knowledge of Deep Learning and Machine Learning concepts.

Course Outcomes

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

CO1	Outline the significance of various NLP components in text processing and the essential principles governing speech production.	Understand
CO2	Outline methods employed for representing both speech and text.	Understand
CO3	Demonstrate the working of sequence models for text.	Apply
CO4	Apply signal processing techniques to Analyse and depict the speech signal.	Apply
CO5	Apply how sequence models function in text analysis.	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	-
CO2	3	2	3	-	3	-	-	-	-	-	-	-	-	3	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	3	-
CO4	3	2	3	-	3	-	-	-	-	-	-	-	-	3	-
CO5	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	30	-	20
Understand	30	30	40
Apply	-	30	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM 702 - Speech and 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 to Natural Language Processing* Overview of NLP – Introduction to Levels of NLP – Morphology: Derivational & Inflectional Morphology – POS tagging – Parsing: Shallow and Dependency Parsing, Semantics: Word Level Semantics and Thematic roles – Text Pre-processing: Sentence Segmentation – Stemming: Porter Stemmer, Bag of words and Vector Space Model.	[9]
Applications of NLP-1 & NLP-2** Sentiment Classification using ML & DL models – Named Entity Recognition – CRF and LSTMs – Text Summarization – Statistical and Deep Learning models – Machine Translation – Encoder & Decoder Model – Attention Models.	[9]
Introduction to Speech Processing* Fundamentals of speech production – Perception of sound – Vocal tract model – Phonetics – Short-time analysis of the signal – Energy – Zero crossing – Autocorrelation – Short time Fourier analysis.	[9]
Feature Representation of Speech Signal* Mel Frequency Cepstral Coefficients – Perceptual linear prediction (PLP) – Linear prediction cepstral coefficients (LPCC) – Gammatone Frequency Cepstral Coefficients (GFCC) – i-vector – Wavelet Transform – Deep Learning Architectures for Speech Recognition – Dynamic Time Warping (DTW).	[9]
Automatic Speech and Speaker Recognition** Automatic Speech Recognition Formulation: Isolated Word Recognition – Large Vocabulary Continuous Speech Recognition – HMM/GMM Based Speech Recognition – DNN/HMM Model – CNN-Based Speech Recognition – RNN Language Models – Evaluation Metrics, Speaker Recognition Model – Alexa/Google Assistant-Based Application Development.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Dan Jurafsky., James H. Martin “Speech and Language Processing”, Draft of 3rd Edition, Prentice Hall 2022.
2.	Jacob Benesty., M. M. Sondhi., Yiteng Huang "Springer Handbook of Speech Processing", Springer, 2008
Reference(s):	
1.	Uday Kamath., John Liu, James Whitaker "Deep Learning for NLP and Speech Recognition" Springer, ,2019.
2.	Steven Bird, Ewan Klein, Edward Loper "Natural Language Processing with Python", O'Reilly Media. 2009.
3.	Ben Gold, Nelson Morgan, Dan Ellis “Speech and Audio Signal Processing: Processing and Perception of Speech and Music”, John Wiley & Sons, 2011.

*SDG 9 – Industry Innovation and Infrastructure

**SDG 4 – Quality Education

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Natural Language Processing**	
1.1	Overview of NLP	1
1.2	Introduction to Levels of NLP	1
1.3	Morphology: Derivational & Inflectional Morphology	1
1.4	POS tagging	1
1.5	Parsing: Shallow and Dependency Parsing	1
1.6	Semantics: Word Level Semantics and Thematic roles	1
1.7	Text Pre-processing: Sentence Segmentation	1
1.8	Stemming: Porter Stemmer	1
1.9	Bag of Words and Vector Space Model	1
2.0	**Applications of NLP-1 & NLP-2**	
2.1	Sentiment Classification using ML & DL models	1
2.2	Named Entity Recognition	1
2.3	CRF and LSTMs	1
2.4	Vehicle Pollutants and its Effect	1
2.5	Text Summarization	1
2.6	Statistical and Deep Learning models	1
2.7	Machine Translation	1
2.8	Encoder & Decoder Model	1
2.9	Attention Models	1
3.0	**Introduction to Speech Processing**	
3.1	Fundamentals of speech production	2
3.2	Perception of sound	1
3.3	Vocal tract model	1
3.4	Phonetics	1
3.5	Short-time analysis of the signal	1
3.6	Energy, Zero crossing	1
3.7	Autocorrelation	1
3.8	Short-time Fourier analysis	1
4.0	**Feature Representation of Speech Signal**	
4.1	Mel Frequency Cepstral Coefficients	1
4.2	Perceptual linear prediction (PLP)	1
4.3	Linear prediction cepstral coefficients (LPCC)	1
4.4	Gammatone Frequency Cepstral Coefficients (GFCC)	1
4.5	I-vector	1
4.6	Wavelet Transform	1
4.7	Deep Learning Architectures for Speech Recognition	1
4.8	Time-Frequency Representations	1
4.9	Dynamic Time Warping (DTW)	1
5.0	**Automatic Speech and Speaker Recognition**	
5.1	Large vocabulary continuous speech recognition	2
5.2	HMM/GMM-based speech recognition	2
5.3	RNN Language Models	1
5.4	Evaluation metrics	1
5.5	Speaker recognition model	1
5.6	Alexa/Google assistant-based application development	2

Course Designer(s)

1. R P HARSHINI - harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM 703	Explainable AI	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To familiarise concepts related to Explainable Artificial Intelligence (XAI) and interpretable methods, with emphasis on how to build a trustworthy AI system.
- To understand the performance of a machine learning model.
- To understand its ability to produce explainable and interpretable predictions.
- To familiarize the concepts and test procedures for the created model.
- To explore th advantages and obstacles associated with autonomous vehicles.

Pre-requisites

- Basic Knowledge of AI and ML.

Course Outcomes

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

CO1	Gain insight into the methods and terminologies utilized in Explainable AI.	Understand
CO2	Outline the methods utilized in XAI and apply appropriate XAI models or approaches for the given application.	Apply
CO3	Design and develop XAI use cases for real time applications.	Apply
CO4	Develop test procedures to evaluate the effectiveness of the created model.	Apply
CO5	Explore the advantages and obstacles associated with electric, hybrid, and autonomous vehicles.	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	-
CO2	3	2	-	2	-	-	-	-	-	-	-	-	-	3	-
CO3	3	2	3	2	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	3	2	3	-	-	-	-	-	-	-	-	3	-
CO5	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	-	-	-
Understand	40	30	50
Apply	20	30	30
Analyse	-	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Artificial Intelligence and Machine Learning

60 AM 703 - Explainable AI

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 Explainable Artificial Intelligence* Fundamentals of XAI – Categorization of XAI – Taxonomy of XAI methods for Machine Learning – Machine Learning Interpretability – Causal Model Induction – Causality learning – XAI techniques and limitations	[9]
XAI Models** Ante-hoc Explainability (AHE) models – Post-hoc Explainability (PHE) models – Interactive Machine Learning (IML) – Black Box Explanation through Transparent Approximation (BETA) models – Hybrid Models – Counterfactual Explanations – Rule-Based Models	[9]
XAI Methods* XAI Techniques – Local Interpretable Model-Agnostic Explanations (LIME) – Understanding Mathematical representation of LIME – Shapley Additive explanations (SHAP) – Diverse Counterfactual Explanations (DiCE) – Layer-wise Relevance Propagation (LRP) – Integrated Gradients – Partial Dependence Plots (PDP) – Contrastive Explanation	[9]
Trust and acceptance** Metrics to evaluate XAI – Trustworthy Explainability Acceptance – Power Quality Disturbance (PQD) classification, Methods for measuring human intelligence – Evaluating AI system – Integrated Gradients – Concept Activation Vectors (CAVs) – Surrogate Models – Model-specific Explainability Techniques	[9]
Building Trustworthy Model with Explainable AI ** Medical diagnosis – Making AI Decisions Trustworthy for Physicians and Patients – Sales predictions on the house sale – Transparent Model Architectures – Feature Importance Analysis – Local Interpretability Techniques – Integration of Domain Knowledge	[9]
Total Hours:	**45**

Text Book(s):	
1.	Molnar, Christoph. “Interpretable machine learning. A Guide for Making Black Box Models Explainable”, 2019. https://christophm.github.io/interpretable-ml-book/.
2.	Explainable Artificial Intelligence: An Introduction to Interpretable Machine Learning, Uday Kamath: John Liu, Springer, ISBN 9783030833558
Reference(s):	
1.	Tim Miller Explanation in Artificial Intelligence: https://arxiv.org/abs/1706.07269
2.	A Guide for making black-box: https://christophm.github.io/interpretable-ml-book/ machine learning models
3.	Explainable AI: A Review of Machine Learning Interpretability Methods https://www.mdpi.com/1099-4300/23/1/18
4.	Lötsch, J.; Kringel, D.; Ultsch, A. Explainable Artificial Intelligence (XAI) in Biomedicine: Making AI Decisions Trustworthy for Physicians and Patients, BioMedInformatics 2022, 2, 1-17. https://doi.org/10.3390/biomedinformatics2010001

*SDG 9 – Industry Innovation and Infrastructure

**SDG 4 – Quality Education

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Explainable Artificial Intelligence**	
1.1	Introduction to Explainable Artificial Intelligence: Fundamentals of XAI	1
1.2	Categorization of XAI	1
1.3	Taxonomy of XAI Methods for Machine Learning	1
1.4	Machine Learning Interpretability	1
1.5	Causal Model Induction	1
1.6	Causality learning	1
1.7	User Feedback and Iterative Design	1
1.8	XAI techniques and limitations	1
1.9	Real-World Applications	1
2.0	**XAI Models**	
2.1	XAI Models: Ante-hoc Explainability (AHE) models	1
2.2	Post-hoc Explainability (PHE) models	1
2.3	Interactive Machine Learning (IML)	1
2.4	Black Box Explanation through Transparent Approximation (BETA) models	2
2.5	Hybrid Models	1
2.6	Counterfactual Explanations	2
2.7	Rule-Based Models	1
3.0	**XAI Methods**	
3.1	XAI Techniques	1
3.2	Local Interpretable Model-Agnostic Explanations (LIME)	2
3.3	Understanding the Mathematical representation of LIME	1
3.4	Shapley Additive Explanations (SHAP)	1
3.5	Diverse Counterfactual Explanations (DiCE)	1
3.6	Layer-wise Relevance Propagation (LRP)	1
3.7	Partial Dependence Plots (PDP)	1
3.8	Contrastive Explanation	1
4.0	**Trust and acceptance**	
4.1	Trust and acceptance: Metrics to evaluate XAI	1
4.2	Trustworthy explainability Acceptance	1
4.3	Power Quality Disturbance (PQD), classification	1
4.4	Methods for measuring human intelligence	1
4.5	Evaluating AI system	1
4.6	Integrated Gradients	1
4.7	Concept Activation Vectors (CAVs)	1
4.8	Surrogate Models	1
4.9	Model-specific explainability Techniques	1
5.0	**Building Trustworthy Model with Explainable AI**	
5.1	Building Trustworthy Model with Explainable AI: Medical diagnosis	2
5.2	Making AI Decisions Trustworthy for Physicians and Patients	2
5.3	Sales Predictions on the house sale	1
5.4	Transparent Model Architectures	1
5.5	Feature Importance Analysis	1
5.6	Local Interpretability Techniques	1
5.7	Integration of Domain Knowledge	1

Course Designer(s)

1. R P HARSHINI - harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

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
CO2	Comply with 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	-	-	-
CO2	-	-	-	-	-	-	-	3	3	3	-	3	-	-	-
CO3	-	-	-	-	3	-	-	3	3	3	-	3	-	-	-
CO4	-	-	-	-	-	-	-	3	3	-	-	3	-	-	-
CO5	-	-	2	2	-	-	-	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**

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to ALL Branches								
60 AC 001 - Research Skill Development								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	2	0	0	15	0	100	-	100

Research - Scientific Approach* Types of Research - Identification and Clarification of the problem - Formulating hypothesis, Selection of sample and tools of data collection - Testing the hypothesis – Conclusion	[3]
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

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

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 - 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
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 Score	1
4.3	Quality 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

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AB 001	National Cadet Corps - AIR Wing	Category	L	T	P	Credit
		-	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 learning military subjects including weapon training and motivate them to join in tri-services

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	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	-	-	-	-	-
CO2	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
3 - Substantial; 2 - Moderate; 1 - Slight															

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AB 001 - National Cadet Corps - AIR Wing								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	2	0	2	45	3	50	50	100

NCC Organization and 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-Pak War-1971- Operation Safed Sagar. National Integration- Unity in diversity- Contribution of youth in nation building- National integration council- Images and Slogans on National Integration.	[9]
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- Side pace, Pace forward and to the rear- Marking time- Drill with arms- Ceremonial drill- Guard mounting.(WITH DEMONSTRATION)	[9]
Principles of Flight Laws of motion- Forces acting on aircraft- Bernoulli"s theorem- Stalling-Primary control surfaces- Secondary control surfaces- Aircraft recognition	[9]
Aero Engines Introduction of Aero engine- Types of engine- Piston engine- Jet engines- Turboprop engines- Basic Flight Instruments- Modern trends.	[9]
Aero Modeling History of Aero modeling- Materials used in Aero modeling- Types of Aero models – Static Models- Gliders-Control line models- Radio Control Models- Building and Flying of Aero models.	[9]
Total Hours:	**45**

Text Book(s):	
1.	"National Cadet Corps- A Concise handbook of NCC Cadets", Ramesh Publishing House, New Delhi, 2014.
Reference(s):	
1.	"Cadets Handbook – Common Subjects SD/SW", published by DG NCC, New Delhi.
2.	"Cadets Handbook- Specialized Subjects SD/SW", published by DG NCC, New Delhi.
3.	"NCC OTA Precise", published by DG NCC, New Delhi.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicate

Course Designer(s)

1. Flt Lt V.R. SADASIVAM - sadasivam@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AB 002	National Cadet Corps - Army Wing	Category	L	T	P	Credit
		-	2	0	2	3

Objectives

- To develop character, camaraderie
- To inculcate discipline, secular outlook
- To 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, self-reliance and dignity of labour in the cadets

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, and 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 - Substantial; 2 - Moderate; 1 - Slight															

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to all Branches								
60 AB 002 - National Cadet Corps - Army Wing								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	2	0	2	45	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.	[9]
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).	[9]
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.	[9]
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-SGSYJGSY-NSAP-PMGSY-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.	[9]
Specialized Subject (ARMY) Basic structure of Armed Forces- Military History – War heroes- battles of Indo-Pak war- Param Vir Chakra- Career in the Defence forces- Service tests and interviews.	[9]
Total Hours:	**45**

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.

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**NCC Organization & National Integration**	
1.1	NCC Organization	1
1.2	History of NCC and NCC Organization	1
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
2.0	**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
3.0	**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
4.0	**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
5.0	**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

Course Designer(s)

1. CT E CHANDRA KUMAR - chandrakumar@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM 7P1	Machine Vision Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To enhance the image using various image enhancement methods
- To segment the image and extract the features
- To track object from the extracted video frame to support visual inspection process
- To apply various image enhancement techniques for better visibility and analysis of images
- To perform image segmentation and feature extraction

Pre-requisites

- Basic knowledge of Machine Learning and Visualization techniques.

Course Outcomes

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

CO1	Identify the required operations that helps to segment an object from an enhanced image.	Analyse
CO2	Apply various techniques to Analyse and extract features that helps in visual inspection and classification	Apply
CO3	Apply visual inspection process to track object from the extracted video frame.	Apply
CO4	Apply machine learning algorithms for automated visual inspection	Apply
CO5	Evaluate the effectiveness of visual inspection methods through statistical analysis	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	-
CO2	3	3	-	-	3	-	-	-	-	-	-	-	-	3	-
CO3	3	2	-	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	-	3	-	-	-	-	-	-	-	-	3	-
CO5	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

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E –CSE(Artificial Intelligence and Machine Learning)								
60 AM 7P1 – Machine Vision 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. Program to display different types of images from different color models. *
2. Program to perform histogram equalization on the image. *
3. Program to perform the edge detection process and extract edges from the input image.
4. Program to perform segmentation, extract and display the segmented region.
5. Program to Analyse and describe the segmented region.
6. Program to detect an object from the input frame.
7. Program to track the object between two frames from image/video. *

Design Experiments:

1. Program to demonstrate to understand a scene and generate caption.
2. Program to classify defective object from the correct object.

Tools Used: Python, MATLAB, libraries like PIL or OpenCV

Lab Manual	
1.	"Machine Vision Lab Manual", Department of CSE (AIML), KSRCT.

*SDG 9 – Industry, Innovation, and Infrastructure

*SDG 4 – Quality Education

Course Designer(s)

1. K.Praveen – praveen@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM 7P2	Speech and Language Processing Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- Be competent with fundamental concepts for natural language processing and automatic speech recognition
- To understand technologies involved in developing speech and language applications
- To demonstrate the use of deep learning for building applications in speech and natural language processing
- To gain hands-on experience in implementing various text representation methods
- To explore Advanced Neural Network Architectures for NLP Tasks

Pre-requisites

- NIL

Course Outcomes

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

CO1	Apply NLTK, Spacy, and Speech Recognition packages for advanced NLP techniques in text and speech data preprocessing.	Apply
CO2	Apply analytical methods to evaluate the efficacy of BOW and topic models in capturing semantic meaning and enhancing classification accuracy across diverse datasets.	Apply
CO3	Analyse how neural network architectures such as CNNs for sentiment analysis and RNNs for Named Entity Recognition affect complex NLP tasks, while evaluating their strengths and limitations.	Analyse
CO4	Apply the NLTK, SpaCy, and Speech Recognition packages to preprocess text and speech data, enabling advanced natural language processing techniques for various applications.	Apply
CO5	Analyze the effectiveness topic modeling approaches in capturing semantic meaning, enhancing classification accuracy across diverse datasets and assess their performance in real-world scenarios.	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	-
CO2	3	3	-	-	3	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	3	-	-	3	-	-	-	-	-	-	-	-	3	-
CO5	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	-	-	-	-	-
Apply	25	12	50	-	50
Analyse	25	13	50	-	50
Evaluate	-	-	-	-	-
Create	-	-	-	-	-
Total	50	25	100	-	100

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Artificial Intelligence and Machine Learning								
60 AM 7P2 – Speech and Language Processing 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. Installing various packages for text and Speech Processing: NLTK, Spacy, Speech Recognition etc.
2. POS Tagging and Parsing using various python packages.
3. Implementation of BOW, topic models for text representation and classification.
4. Implementing N-gram language models for next word prediction.
5. Implementing Word embedding based text classification
6. Implementing CNN for sentiment analysis.
7. Implementing RNN for Named Entity recognition.
8. Implementing text summarization using deep learning.
9. Implementing machine translation using encoder-decoder models.
10. Developing speech recognition system to recognize voice commands.

Design Experiments:

1. Implementing chatbot using deep learning.
2. Developing speech recognition system to recognize continuous speech.

Tools Used: Python, Jupyter Notebook or any Python IDE, NLTK, Spacy, scikit-learn, Gensim, Keras, TensorFlow, and PyTorch.

Lab Manual

1.	"Speech and Language Processing Lab Manual", Department of CSE (AIML), KSRCT.

*SDG 4 – Quality Education

Course Designer(s)

1. K. Praveen – praveen@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM 7P3	Project Work Phase- I	Category	L	T	P	Credit
		CG	0	0	4	2

Objectives

- To impart practical knowledge to the students
- To apply the gained engineering concepts in their project work
- To provide an exposure to the students to collect and review the research articles, journals, conference proceedings relevant to their project work
- To design an innovative project work
- To implement the project with the recent IT tools

Pre-requisites

- Nil

Course Outcomes

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

CO1	Identify engineering problems relevant to the domain and perform related literature survey.	Apply
CO2	Analyse and identify an appropriate methodology to solve the problem.	Analyse
CO3	Do experimentation / simulation / programming / fabrication, collect and interpret data.	Apply
CO4	Prepare and present their technical report with relevant project work details	Analyse
CO5	Demonstrate their responsibility as an individual and as a leader in a team.	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	2	3	3	3	3	3	3	2	2	-
CO2	3	3	3	3	3	2	2	3	3	3	3	3	3	3	-
CO3	3	3	3	3	3	2	2	3	3	3	3	3	3	3	-
CO4	3	2	2	3	2	2	2	3	3	3	3	3	2	2	-
CO5	3	-	3	-	-	-	2	3	3	3	3	3	2	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

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

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Artificial Intelligence and Machine Learning								
60 AM 7P3 - Project Work - Phase I								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	0	0	4	60	2	100	0	100

Methodology:

1. Project Work Phase-I shall be evaluated by the project review committee (Project coordinator, Project Guide and HOD/Subject experts in the department)
2. Three reviews shall be conducted with subject expert and the student(s) shall make a presentation on the progress made by him / her / them during the reviews
3. Student(s) shall submit a project technical report comprising of title, problem statement, importance of work, modifications, proof of concept, methodology and review of literature during the 3rd review
4. The total marks obtained in the three reviews shall be reduced to 100 marks and rounded to the nearest integer
5. The schedule will be announced by the Project Coordinator and Head of the Department

Course Designer(s)

1. Dr.C.Rajan – rajan@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

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 2022 - 2023)

EIGHTH 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 AM E5*	Professional Elective V	2	40	60	100	45	100
PRACTICAL								
2	60 AM 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.

** 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.

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

60 AM 8P1	Project Work Phase- II	Category	L	T	P	Credit
		CG	0	0	16	8

Objectives

- To impart practical knowledge to the students
- To apply the gained engineering concepts in their project work
- To provide an exposure to the students to collect and review the research articles, journals, conference proceedings relevant to their project work
- To design an innovative project work
- To implement the project with the recent IT tools

Pre-requisites

- **Project Work - Phase I**

Course Outcomes

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

CO1	Identify engineering problems relevant to the domain and carry out a literature survey for its support.	Apply
CO2	Apply algorithm and design techniques in the project and experience their outcome in their own real time project scenario.	Apply
CO3	Do experiment / simulate / program / fabricate, collect and interpret data.	Apply
CO4	Document the results in the form of technical report / presentation.	Analyse
CO5	Develop the management skills to achieve the project goal by working as a team and demonstrate the technical skills acquire to provide feasible solution for real-life 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	3	3	2	3	3	3	3	3	3	2	2	-
CO2	3	3	3	3	3	2	2	3	3	3	3	3	3	3	-
CO3	3	3	3	3	3	2	2	3	3	3	3	3	3	3	-
CO4	3	2	2	3	2	2	2	3	3	3	3	3	2	2	-
CO5	3	-	3	-	-	-	2	3	3	3	3	3	2	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Internal Assessment (60)					End Semester (40)
Items	**Review 1**	**Review 2**	**Review 3**	**Publication***	
Marks	**5**	**10**	**15**	**30**	**40**
	Total internal marks 60				

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Artificial Intelligence and Machine Learning								
60 AM 8P1 - Project Work - Phase II								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VIII	0	0	16	240	8	60	40	100

Methodology:

The objective of Project Work & Dissertation is to enable the student to extend further investigative a study on the project

1. Three reviews shall be conducted by project review committee (Project coordinator, Project Guide and HOD/Subject experts in the department)
2. Student(s) shall make a presentation on the progress made by him / her / them during the reviews
3. Student(s) shall submit a project technical report comprising of title, problem statement, importance of work, methodology, experimental work and outcome of the work carried out during the 3rd review
4. The work carried out may be either under the guidance of a supervisor from the department or jointly with a supervisor drawn from other department / academic institution / R& D laboratory / Industry
5. The project reviews (R1+R2+R3+R4) shall carry a maximum of 60 marks
6. The project report shall be submitted as per the approved guidelines given by the college, the viva-voce examination shall carry 40 marks
7. Marks are awarded to each student of the project group based on the individual performance in the viva-voce examination

*SDG 4 – Quality Education

Course Designer(s)

1. Dr.C.Rajan – rajan@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

60 AM E11	Exploratory Data Analysis	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To outline an overview of exploratory data analysis
- To implement data visualization using Matplotlib
- To perform univariate data exploration and analysis
- To apply bivariate data exploration and analysis
- To use Data exploration and visualization techniques for multivariate and time series data

Pre-requisites

- Basic Understanding of Statistics and Probability.

Course Outcomes

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

CO1	Acquire knowledge on the fundamentals of exploratory data analysis.	Understand
CO2	Implement the data visualization using Matplotlib.	Apply
CO3	Perform univariate data exploration and analysis.	Analyse
CO4	Apply bivariate data exploration and analysis.	Apply
CO5	Apply Data exploration and visualization techniques for multivariate and time series data.	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	-
CO2	2	2	2	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	3	3	-	-	-	-	-	-	-	-	3	-
CO4	2	2	2	3	3	-	-	-	-	-	-	-	-	3	-
CO5	2	2	2	2	1	-	-	-	-	-	-	-	-	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	30	-	10	-	-	40	-
Apply	30	50	30	50	50	50	50
Analyse	-	50	20	50	50	10	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E11 – Exploratory Data Analysis

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	2	0	2	60	3	50	50	100

Exploratory Data Analysis** EDA fundamentals – Understanding data science – Significance of EDA – Making sense of data – Comparing EDA with classical and Bayesian analysis – Software tools for EDA - Visual Aids for EDA- Data transformation techniques-merging database, reshaping and pivoting, Transformation techniques.	[6]
Exploratory Data Analysis using Python* Data Manipulation using Pandas – Pandas Objects – Data Indexing and Selection – Operating on Data – Handling Missing Data – Hierarchical Indexing – Combining datasets – Concat, Append, Merge and Join – Aggregation and grouping.	[6]
Univariate Analysis* Introduction to Single variable: Distribution Variables - Numerical Summaries of Level and Spread - Scaling and Standardizing – Inequality.	[6]
Bivariate Analysis* Relationships between Two Variables - Percentage Tables - Analysing Contingency Tables - Handling Several Batches – Scatterplots - Resistant Lines.	[6]
Multivariate and Time Series Analysis** Introducing a Third Variable - Causal Explanations - Three-Variable Contingency Tables and Beyond – Fundamentals of TSA – Characteristics of time series data – Data Cleaning – Time-based indexing – Visualizing – Grouping – Resampling.	[6]
Practical: 1. Perform exploratory data analysis (EDA) with datasets like email data set. Export all your emails as a dataset, import them inside a panda's data frame, visualize them and get different insights from the data 2. Working with Numpy arrays, Pandas data frames, Basic plots using Matplotlib 3. Explore various variable and row filters in R for cleaning data. Apply various plot features in R on sample data sets and visualize 4. Perform Time Series Analysis and apply the various visualization Techniques 5. Perform Data Analysis and representation on a Map using various Map data sets with Mouse Rollover effect, user interaction, etc 6. Build cartographic visualization for multiple datasets involving various countries of the world; states and districts in India etc 7. Perform EDA on Wine Quality Data Set **Tools used:** R/ Python /Tableau Public/ Power BI	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):

1.	Suresh Kumar Mukhiya, Usman Ahmed, "Hands-On Exploratory Data Analysis with Python", Packt Publishing, 2020.
2.	Jake Vander Plas, "Python Data Science Handbook: Essential Tools for Working with Data", First Edition, O Reilly, 2017.

Reference(s):

1.	Eric Pimpler, "Data Visualization and Exploration with R", GeoSpatial Training service, 2017.
2.	Claus O. Wilke, "Fundamentals of Data Visualization", O'reilly publications, 2019.
3.	Matthew O. Ward, Georges Grinstein, Daniel Keim, "Interactive Data Visualization: Foundations, Techniques, and Applications", 2nd Edition, CRC press, 2015.
4.	Catherine Marsh, Jane Elliott, "Exploring Data: An Introduction to Data Analysis for Social Scientists", Wiley Publications, 2nd Edition, 2008.

*SDG 9 – Industry Innovation and Infrastructure

**SDG 4 – Quality Education

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Exploratory Data Analysis**	
1.1	EDA fundamentals, Understanding data science , Significance of EDA	1
1.2	Making sense of data	1
1.3	Comparing EDA with classical and Bayesian analysis	1
1.4	Software tools for EDA	1
1.5	Visual Aids for EDA	1
1.6	Data transformation techniques-merging database, reshaping and pivoting, Transformation techniques.	1
2	**Exploratory Data Analysis using Python**	
2.1	Data Manipulation using Pandas	1
2.2	Pandas Objects, Data Indexing and Selection	1
2.3	Operating on Data	1
2.4	Handling Missing Data, Hierarchical Indexing	1
2.5	Combining datasets – Concat , Append, Merge and Join	1
2.6	Aggregation and grouping	1
3	**Univariate Analysis**	
3.1	Introduction to Single Variable	1
3.2	Distribution Variables	1
3.3	Numerical Summaries of Level And Spread	1
3.4	Scaling and Standardizing	2
3.5	Inequality	1
4	**Bivariate Analysis**	
4.1	Relationships between Two Variables	1
4.2	Percentage Tables	1
4.3	Analysing Contingency Tables	1
4.4	Handling Several Batches	1
4.5	Scatterplots	1
4.6	Resistant Lines	1
5	**Multivariate and Time Series Analysis**	
5.1	Introducing a Third Variable	1
5.2	Causal Explanations	1
5.3	Three-Variable Contingency Tables and Beyond	1
5.4	Fundamentals of TSA	1
5.5	Characteristics of time series data, Data Cleaning	1
5.6	Time-based indexing, Visualizing, Grouping, Resampling.	1
Practical:		
1.	Perform exploratory data analysis (EDA) with datasets like email data set. Export all your emails as a dataset, import them inside a pandas data frame, visualize them and get different insights from the data	4
2.	Working with Numpy arrays, Pandas data frames , Basic plots using Matplotlib	4
3.	Explore various variable and row filters in R for cleaning data. Apply various plot features in R on sample data sets and visualize	4
4.	Perform Time Series Analysis and apply the various visualization techniques	4
5.	Perform Data Analysis and representation on a Map using various Map data sets with Mouse Rollover effect, user interaction, etc	4
6.	Build cartographic visualization for multiple datasets involving various countries of the world; states and districts in India etc	4
7.	Perform EDA on Wine Quality Data Set	6

Course Designer(s)

1. Mr.K.Praveen – praveen@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM E12	App Development	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To learn development of native applications with basic GUI Components
- To develop cross-platform applications with event handling
- To develop applications with location and data storage capabilities
- To develop web applications with database access

Pre-requisites

- Basic Knowledge of JAVA Programming.

Course Outcomes

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

CO1	Acquire Knowledge on Various Mobile and Web Applications Development Tools.	Understand
CO2	Acquire Knowledge on Native applications and develop App using native app.	Apply
CO3	Acquire Knowledge on Hybrid applications and develop App using Flutter.	Apply
CO4	Gain Proficiency in Cross platform applications with basic GUI and event handling methods.	Apply
CO5	Gain insights into the deployment and testing of mobile and web applications.	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	-
CO2	3	2	2	-	3	-	-	-	-	-	-	-	2	3	-
CO3	3	2	2	-	3	-	-	-	-	-	-	-	2	3	-
CO4	3	2	2	-	3	-	-	-	-	-	-	-	2	3	-
CO5	3	2	2	-	3	-	-	-	-	-	-	-	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	-	-	-	-	-	-	50
Understand	30	-	30	-	-	40	-
Apply	30	100	30	100	100	60	50
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM E12 - App 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

Fundamentals of Mobile & Web Application Development* Basics of Web and Mobile Application Development, Native App, Hybrid App, Cross-platform App, What is Progressive Web App, Responsive Web Design.	[6]
Native App Development Using Java* Native Web App, Benefits of Native App, Scenarios to create Native App, Tools for creating Native App, Cons of Native App, Popular Native App Development Frameworks, Java & Kotlin for Android, Swift & Objective-C for iOS.	[6]
Hybrid App Development * Hybrid Web App, Benefits of Hybrid App, Criteria for creating Native App, Tools for creating Hybrid App, Cons of Hybrid App, Popular Hybrid App Development Frameworks – Flutter Basics and Requirements.	[6]
Cross-Platform App Development Using React-Native** What is Cross-platform App, Benefits of Cross-platform App, Criteria for creating Cross-platform App, Tools for creating Cross-platform App, Cons of Cross-platform App, Popular Cross-platform App Development Frameworks - React-Native, Basics of React Native, Native Components, JSX, State, Props.	[6]
Deployment of Mobile Application* Deployment Process Overview – Preparing for Deployment – App Store Guidelines – Continuous Integration and Continuous Deployment – Testing.	[6]
Practical: 1. Using react native, build a cross platform application for a BMI calculator 2. Build a cross platform application for a simple expense manager which allows entering expenses and income on each day and displays category wise weekly income and expense 3. Develop a cross platform application to convert units from imperial system to metric system (km to miles, kg to pounds etc.,) 4. Design and develop a cross platform application for day to day task (to-do) management 5. Design an android application using Flutter for a user login screen with username, password, reset button and a submit button. Also, include header image and a label. Use layout managers 6. Design and develop an android application using Flutter to find and display the current location of the user 7. Write programs using Java to create Android application having Databases I. For a simple library application II. For displaying books available, books lend, book reservation. Assume that student information is available in a database which has been stored in a database server **Tools used:** java, react native , Flutter, SQLite/Firebase	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Dawn Griffiths, “Head First Android Development”, O’Reilly, 1st edition.
2.	Raymond K. Camden, Manning, “Apache Cordova in Action”, 2015.
Reference(s):	
1.	John Horton, “Android Programming for Beginners”, Packt Publishing, 2nd Edition.
2.	Shaun Lewis and Mike Dunn,” Native Mobile Development”.
3.	Pawan Lingras, Matt Triff and Rucha Lingras “Building Cross-Platform Mobile and Web Apps for Engineers and Scientists: An Active Learning Approach”.
4.	John M Wargo, “Apache Cordova 4 Programming”, 2015.

*SDG 9 – Industry Innovation and Infrastructure

**SDG 4 – Quality Education

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Fundamentals of Mobile & Web Application Development**	
1.1	Basics of Web and Mobile application development	1
1.2	Native App	1
1.3	Hybrid App	1
1.4	Cross-platform App	1
1.5	What is Progressive Web App	1
1.6	Responsive Web design	1
2	**Native App Development Using Java**	
2.1	Native Web App, Benefits of Native App	1
2.2	Scenarios to create Native App	1
2.3	Tools for creating Native App, Cons of Native App	1
2.4	Popular Native App Development Frameworks	1
2.5	Java & Kotlin for Android	1
2.6	Swift & Objective-C for iOS	1
3	**Hybrid App Development**	
3.1	Hybrid Web App, Benefits of Hybrid App	1
3.2	Criteria for creating Native App	1
3.3	Tools for creating Hybrid App	1
3.4	Cons of Hybrid App	1
3.5	Popular Hybrid App Development Frameworks	1
3.6	Flutter Basics and Requirements	1
4	**Cross-Platform App Development Using React-Native**	
4.1	What is Cross-platform App, Benefits of Cross-platform App	1
4.2	Criteria for creating Cross-platform App	1
4.3	Tools for creating Cross-platform App, Cons of Cross-platform App	1
4.4	Popular Cross-platform App Development Frameworks	1
4.5	React-Native	1
4.6	Basics of React Native - Native Components, JSX, State, Props	1
5	**Deployment of Mobile Application**	
5.1	Deployment Process Overview	1
5.2	Preparing for Deployment	1
5.3	App Store Guidelines	1
5.4	Continuous Integration and Continuous Deployment	2
5.5	Testing	1
Practical:		
1.	Using react native, build a cross platform application for a BMI calculator	4
2.	Build a cross platform application for a simple expense manager which allows entering expenses and income on each day and displays category wise weekly income and expense	4
3.	Develop a cross platform application to convert units from imperial system to metric system (km to miles, kg to pounds etc.,)	4
4.	Design and develop a cross platform application for day to day task (to-do) management	4
5.	Design an android application using Flutter for a user login screen with username, password, reset button and a submit button. Also, include header image and a label. Use layout managers	4
6.	Design and develop an android application using Flutter to find and display the current location of the user	4
7.	Write programs using Java to create Android application having Databases ● For a simple library application ● For displaying books available, books lend, book reservation. Assume that student information is available in a database which has been stored in a database server	6

Course Designer(s)

1. C.Janani - jananic@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM E13	Ethical Hacking	Category	L	T	P	Credit
		PE	2	0	2	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
- To practice tools to perform ethical hacking to expose the vulnerabilities

Pre-requisites

- Basic Knowledge of Network Protocols and Architectures.

Course Outcomes

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

CO1	Acquire knowledge on basics of computer-based vulnerabilities	Understand
CO2	Acquire knowledge on different foot printing, reconnaissance and scanning methods.	Apply
CO3	Demonstrate the enumeration and vulnerability analysis methods	Analyse
CO4	Acquire knowledge on hacking options available in Web and wireless applications.	Analyse
CO5	Acquire knowledge on the options for network protection.	Remember

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	-	-
CO2	3	2	-	-	3	-	-	-	-	-	-	-	3	-	-
CO3	3	2	-	-	3	-	-	-	-	-	-	-	3	3	-
CO4	3	2	-	-	3	2	-	3	-	-	-	-	3	-	-
CO5	3	2	-	-	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				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	-	-	-	-	-	30	-
Understand	30	-	10	-	-	30	-
Apply	30	100	40	50	50	30	50
Analyse	-	-	10	50	50	10	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E13- Ethical Hacking

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 * Ethical Hacking Overview - Role of Security and Penetration Testers .- Penetration-Testing Methodologies- Laws of the Land - Overview of TCP/IP- The Application Layer - The Transport Layer - The Internet Layer - IP Addressing .- Network and Computer Attacks - Malware - Protecting Against Malware Attacks.- Intruder Attacks - Addressing Physical Security	[6]
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	[6]
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.	[6]
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.	[6]
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.	[6]
Practical: 1. Install Kali or Backtrack Linux / Metasploitable/ Windows XP 2. Practice the basics of Reconnaissance. 3. Using FOCA / SearchDiggity tools, extract metadata and expanding the target list. 4. Aggregates information from public databases using online free tools like Paterva's Maltego. 5. Information gathering using tools like Robtex. 6. Scan the target using tools like Nessus. 7. View and capture network traffic using Wireshark. 8. Automate dig for vulnerabilities and match exploits using Armitage	[30]
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.	"The Basics of Hacking and Penetration Testing" - Patrick Engebretson, SYNGRESS, Elsevier, 2013.
Reference(s):	
1.	"The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws", Dafydd Stuttard and Marcus Pinto, 2011.
2.	Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made easy", Elsevier, 2011 (Unit 3)

* SDG 9 – Industry, Innovation and Infrastructure

**SDG 16: Peace, Justice and Strong Institutions

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

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	1
1.4	Overview of TCP/IP- The Application Layer ,The Transport Layer , The Internet Layer , IP Addressing	1
1.5	Network and Computer Attacks , Malware , Protecting Against Malware Attacks, Intruder Attacks	1
1.6	Addressing Physical Security	1
2	**Foot Printing, Reconnaissance and Scanning Networks**	
2.1	Footprinting Concepts - Footprinting through Search Engines, Web Services, Social Networking Sites, Website, Email	1
2.2	Competitive Intelligence	1
2.3	Footprinting through Social Engineering	1
2.4	Footprinting Tools	1
2.5	Network Scanning Concepts - Port-Scanning Tools	1
2.6	Scanning Techniques - Scanning Beyond IDS and Firewall	1
3	**Enumeration and Vulnerability Analysis**	
3.1	Enumeration Concepts - NetBIOS Enumeration – SNMP, LDAP, NTP, SMTP and DNS Enumeration	1
3.2	Vulnerability Assessment Concepts	1
3.3	Desktop and Server OS Vulnerabilities	1
3.4	Windows OS Vulnerabilities	1
3.5	Tools for Identifying Vulnerabilities in Windows	1
3.6	Linux OS Vulnerabilities- Vulnerabilities of Embedded OSS	1
4	**System Hacking**	
4.1	Hacking Web Servers	1
4.2	Web Application Components, 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.	1
5.2	Cisco Adaptive Security Appliance Firewall	1
5.3	Configuration and Risk Analysis Tools for Firewalls and Routers	1
5.4	Intrusion Detection and Prevention Systems	1
5.5	Network- Based and Host-Based IDSs and IPSs	1
5.6	Web Filtering, Security Incident Response Teams, Honeypots	1
Practical:		
1.	Install Kali or Backtrack Linux / Metasploitable/ Windows XP	3
2.	Practice the basics of reconnaissance	3
3.	Using FOCA / Search Diggity tools, extract metadata and expanding the target list.	4
4.	Aggregates information from public databases using online free tools like Paterva's Maltego.	4
5.	Information gathering using tools like Robtex	4
6.	Scan the target using tools like Nessus	4
7.	View and capture network traffic using Wireshark	4
8.	Automate dig for vulnerabilities and match exploits using Armitage	4

Course Designer(S)

1. Mr.K. Praveen – praveen@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM E14	Augmented Reality/Virtual Reality	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To impart the fundamental aspects and principles of AR/VR technologies
- To know the internals of the hardware and software components involved in the development of AR/VR enabled applications
- To learn about the graphical processing units and their architectures
- To gain knowledge about AR/VR application development
- To know the technologies involved in the development of AR/VR based applications

Pre–requisites

- Basic Understanding of spatial Mathematics and Physics concepts.

Course Outcomes

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

CO1	Acquire foundational knowledge of AR and VR concepts.	Understand
CO2	Identify the tools and technologies pertaining to AR/VR.	Remember
CO3	Insights into the working principle of AR/VR related Sensor devices.	Understand
CO4	Develop the various models using modeling techniques.	Apply
CO5	Develop AR/VR applications in different domains.	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	-
CO2	3	2	3	2	3	-	-	-	-	-	-	-	-	2	-
CO3	3	2	3	2	3	-	-	-	-	-	-	-	-	2	-
CO4	3	2	3	2	3	-	-	-	-	-	-	-	-	3	-
CO5	3	2	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	30	-	-	-	-	30	-
Understand	30	-	30	-	-	30	-
Apply	-	100	30	100	100	40	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM E14 – Augmented Reality/Virtual Reality								
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** Introduction to Virtual Reality – Introduction to Trajectories and Hybrid Space – Three I's of Virtual Reality – Components of VR System – Introduction to AR Technologies – Input Devices – 3D Position Trackers, Types of Trackers – Gesture Interfaces – Types of Gesture Input Devices – Output Devices – Graphics Display, Human Visual System and Personal Graphics Displays.	[6]
VR Modelling** Fundamentals of Modelling – Geometric Modelling – Kinematics Modelling – Transformation Matrices, Object Position, Transformation Invariants, Object Hierarchies – Viewing the 3D World – Physical Modelling – Behavior Modelling – Model Management.	[6]
VR Programming** VR Programming – Toolkits – Scene Graphs – World Toolkit – Java 3D – Comparison of World Toolkit and Java 3D.	[6]
Applications* Human Factors in VR – Methodology and Terminology – VR Health and Safety Issues – VR Applications in Various Fields – Military VR Applications – VR Applications in Manufacturing and Robotics – Information Visualization.	[6]
Augmented Reality* Introduction to Augmented Reality – Computer Vision for AR – Interaction in AR – Modelling and Annotation in AR – Navigation in AR – Wearable Devices for AR.	[6]
Practical: 1. Study of tools like AR toolkit, Vuforia and Blender 2. Use the primitive objects and apply various projection types by handling camera 3. Download objects from asset store and apply various lighting and shading effects 4. Model three dimensional objects using various modelling techniques and apply textures over them 5. Create three dimensional realistic scenes and develop simple virtual reality enabled mobile applications which have limited interactivity 6. Add audio and text special effects to the developed application 7. Develop VR enabled applications using motion trackers and sensors incorporating full haptic interactivity 8. Develop AR enabled applications with interactivity like E learning environment, Virtual walkthroughs and visualization of historic places **Tools used: GuriVR, OSVR, ARToolKit+,** Vuforia, Blender, Unity 3D	[30]
Total Hours: (Lecture – 30; Practical – 30)	**60**

Text Book(s):	
1.	Charles Palmer, John Williamson, "Virtual Reality Blueprints: Create compelling VR experiences for mobile", Packt Publisher, 2018.
2.	Dieter Schmalstieg, Tobias Hollerer, "Augmented Reality: Principles & Practice", Addison Wesley, 2016.
Reference(s):	
1.	John Vince, "Introduction to Virtual Reality", Springer–Verlag, 2004.
2.	William R. Sherman, Alan B. Craig, "Understanding Virtual Reality – Interface, Application, Design", Morgan Kaufmann, 2003.

*SDG 9 – Industry Innovation and Infrastructure

**SDG 4 – Quality Education

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction**	
1.1	Introduction to Virtual Reality , Introduction to Trajectories and Hybrid Space	1
1.2	Three I's of Virtual Reality, Components of VR System	1
1.3	Introduction to AR Technologies	1
1.4	Input Devices – 3D Position Trackers, Types of Trackers	1
1.5	Gesture Interfaces – Types of Gesture Input Devices	1
1.6	Output Devices – Graphics Display, Human Visual System and Personal Graphics Displays	1
2	**VR Modeling**	
2.1	Fundamentals of Modeling	1
2.2	Geometric Modeling	1
2.3	Kinematics Modeling	1
2.4	Transformation Matrices, Object Position, Transformation Invariants, Object Hierarchies	1
2.5	Viewing the 3D World	1
2.6	Physical Modeling, Behavior Modeling, Model Management	1
3	**VR Programming**	
3.1	VR Programming	1
3.2	Toolkits	1
3.3	Scene Graphs	1
3.4	World Toolkit	1
3.5	Java 3D	1
3.6	Comparison of World Toolkit and Java 3D	1
4	**Applications**	
4.1	Human Factors in VR , Methodology and Terminology	1
4.2	VR Health and Safety Issues	1
4.3	VR Applications in Various Fields	1
4.4	Military VR Applications	1
4.5	VR Applications in Manufacturing and Robotics	1
4.6	Information Visualization	1
5	**Augmented Reality**	
5.1	Introduction to Augmented Reality	1
5.2	Computer Vision for AR	1
5.3	Interaction in AR	1
5.4	Modelling and Annotation in AR	1
5.5	Navigation in AR	1
5.6	Wearable Devices for AR	1
Practical:		
1.	Study of tools like AR toolkit, Vuforia and Blender	4
2.	Use the primitive objects and apply various projection types by handling camera	4
3.	Download objects from asset store and apply various lighting and shading effects	4
4.	Model three dimensional objects using various modelling techniques and apply textures over them	4
5.	Create three dimensional realistic scenes and develop simple virtual reality enabled mobile applications which have limited interactivity	4
6.	Add audio and text special effects to the developed application	2
7.	Develop VR enabled applications using motion trackers and sensors incorporating full haptic interactivity	4
8.	Develop AR enabled applications with interactivity like E learning environment, Virtual walkthroughs and visualization of historic places	4

Course Designer(s)

1. C.Janani - jananic@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM E15	Cyber Security	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To learn cybercrime and cyberlaw
- To understand the cyber-attacks and tools for mitigating them
- To understand information gathering
- To learn how to detect a cyber-attack
- To learn how to prevent a cyber-attack

Pre-requisites

- Basic Knowledge of Network Security Protocols and Architectures.

Course Outcomes

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

CO1	Delve into the fundamental aspects of cybersecurity, cybercrime and cyber law.	Understand
CO2	Categorize different attack types and gain practical expertise in utilizing associated tools for execution.	Apply
CO3	Apply various tools to perform information gathering.	Apply
CO4	Apply intrusion techniques to detect intrusion.	Apply
CO5	Apply intrusion prevention techniques to prevent intrusion.	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	-
CO2	2	3	-	-	-	2	-	3	-	-	-	-	3	2	-
CO3	2	2	2	-	3	2	-	-	-	-	-	-	2	2	-
CO4	3	3	2	-	2	2	-	2	-	-	-	-	3	2	-
CO5	3	2	2	-	2	2	-	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	-	-	-	-	-	-	-
Understand	30	-	30	-	-	50	-
Apply	30	100	30	100	100	50	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM E15- Cyber Security								
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* Cyber Security – History of Internet – Impact of Internet – Cia Triad; Reason for Cyber Crime – Need for Cyber Security – History of Cyber Crime; Cybercriminals – Classification of Cybercrimes – A Global Perspective on Cyber Crimes; Cyber Laws – The Indian it Act – Cybercrime and Punishment.	[6]
Attacks and Countermeasures * Oswap; Malicious Attack Threats and Vulnerabilities: Scope of Cyber-Attacks – Security Breach – Types of Malicious Attacks – Malware Attacks, Social Engineering Attack, Wireless Network Attack, Web Application Attack – Common Attack Vectors – Malicious Software – Countermeasures.	[6]
Reconnaissance * Harvester – Whois – Netcraft – Host – Extracting Information from Dns – Social Engineering Reconnaissance; Scanning Techniques – Port Scanning, Network Scanning and Vulnerability Scanning; Scanning Methodology – Nmap Command Switches – Banner Grabbing and OS Finger Printing Techniques.	[6]
Intrusion Detection** Host-Based Intrusion Detection – Network-Based Intrusion Detection – Distributed or Hybrid Intrusion Detection – Intrusion Detection Exchange Format – Honeypots.	[6]
Intrusion Prevention** Firewalls – Need For Firewalls – Firewall Characteristics and Access Policy – Types of Firewalls – Firewall Location and Configurations – Intrusion Prevention Systems – Unified Threat Management Products.	[6]
Practical: 1. Install Kali Linux on Virtual box. 2. Explore Kali Linux and bash scripting. 3. Perform open source intelligence gathering using Netcraft, Whois Lookups, DNS Reconnaissance, Harvester and Maltego. 4. Understand the Nmap command d and scan a target using Nmap. 5. Install metasploitable2 on the virtual box and search for unpatched vulnerabilities. 6. Use Metasploit to exploit an unpatched vulnerability. 7. Install Linus server on the virtual box and install SSH. 8. Use Fail2banto scan log files and ban IPS that show the malicious signs.	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Anand Shinde, “Introduction to Cyber Security Guide to the World of Cyber Security”, Notion Press, 2021.
2.	Nina Godbole, Sunit Belapure, “Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Wiley Publishers, 2011.
Reference(s):	
1.	David Kim, Michael G. Solomon, “Fundamentals of Information Systems Security”, Jones & Bartlett Learning Publishers, 2013.
2.	Patrick Engebretson, “The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made easy”, Elsevier, 2011.
3.	Kimberly Graves, “CEH Official Certified Ethical hacker Review Guide”, Wiley Publishers, 2007.
4.	William Stallings, Lawrie Brown, “Computer Security Principles and Practice”, Third Edition, Pearson Education, 2015.

* SDG – 4 Quality Education
**SDG 9: Industry, Innovation, and Infrastructure
***SDG 16: Peace, Justice, and Strong Institutions

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents And Lecture Schedule		
S. No.	**Topics**	**No. Of Hours**
1	**Introduction**	
1.1	Cyber Security – History of Internet , Impact of Internet ,CIA Triad	1
1.2	Reason for Cyber Crime, Need for Cyber Security	1
1.3	History of Cyber Crime; Cybercriminals	1
1.4	Classification of Cybercrimes	1
1.5	A Global Perspective on Cyber Crimes; Cyber Laws	1
1.6	The Indian IT Act – Cybercrime and Punishment	1
2	**Attacks And Countermeasures**	
2.1	OSWAP; Malicious Attack Threats and Vulnerabilities: Scope of Cyber-Attacks	1
2.2	Security Breach	1
2.3	Types of Malicious Attacks - Malware Attacks, Social Engineering Attack, Wireless Network Attack, Web Application Attack	1
2.4	Common Attack Vectors	1
2.5	Malicious Software	1
2.6	Countermeasures	1
3	**Reconnaissance**	
3.1	Harvester , Whois , Netcraft , Host	1
3.2	Extracting Information from DNS, Social Engineering Reconnaissance	1
3.3	Scanning Techniques – Port Scanning, Network Scanning and Vulnerability Scanning	1
3.4	Scanning Methodology	1
3.5	Nmap Command Switches	1
3.6	Banner Grabbing and OS Finger printing Techniques	1
4	**Intrusion Detection**	
4.1	Host -Based Intrusion Detection	1
4.2	Network -Based Intrusion Detection	1
4.3	Distributed or Hybrid Intrusion Detection	1
4.4	Intrusion Detection Exchange Format	1
4.5	Honeypots	2
5	**Intrusion Prevention**	
5.1	Firewalls, Need for Firewalls	1
5.2	Firewall Characteristics and Access Policy	1
5.3	Types of Firewalls	1
5.4	Firewall Location and Configurations	1
5.5	Intrusion Prevention Systems	1
5.6	Unified Threat Management Products	1
Practical:		
1.	Install Kali Linux on Virtual box.	2
2.	Explore Kali Linux and bash scripting.	4
3.	Perform open-source intelligence gathering using Netcraft, Whois Lookups, DNS Reconnaissance, Harvester and Maltego.	4
4.	Understand the Nmap command d and scan a target using Nmap.	4
5.	Install metasploitable2 on the virtual box and search for unpatched vulnerabilities.	4
6.	Use Metasploit to exploit an unpatched vulnerability.	4
7.	Install Linus server on the virtual box and install SSH.	4
8.	Use Fail2banto scan log files and ban IPS that show the malicious signs.	4

Course Designer(S)

1. C. Janani - jananic@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM E16	Knowledge Engineering	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To understand the basics of Knowledge Engineering
- To discuss methodologies and modeling for Agent Design and Development
- To design and develop ontologies.
- To apply reasoning with ontologies and rules
- To understand learning and rule learning

Pre-requisites

- Basic Knowledge of Artificial Intelligence.

Course Outcomes

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

CO1	Aquire the basics of Knowledge Engineering.	Understand
CO2	Apply methodologies and modelling for Agent Design and Development.	Apply
CO3	Formulate and construct ontologies tailored for application in various domains.	Apply
CO4	Apply reasoning with ontologies and rules.	Apply
CO5	Aquire knowledge on learning and rule learning.	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	2	3	-	2	-	-	-	-	-	-	-	-	2	-
CO3	2	2	3	-	2	-	-	-	-	-	-	-	-	2	-
CO4	2	2	3	-	2	-	-	-	-	-	-	-	-	3	-
CO5	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	-	-	-	-	-	-	-
Understand	30	-	20	-	-	50	-
Apply	30	100	40	100	100	50	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM E16 – Knowledge Engineering								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	2	0	2	60	3	50	50	100

Reasoning under Uncertainty** Introduction – Abductive reasoning – Probabilistic reasoning: Enumerative Probabilities – Subjective Bayesian view – Belief Functions – Baconian Probability – Fuzzy Probability – Uncertainty methods - Evidence-based reasoning – Intelligent Agent – Mixed-Initiative Reasoning – Knowledge Engineering.	[6]
Methodology and Modeling** Conventional Design and Development – Development tools and Reusable Ontologies – Agent Design and Development using Learning Technology – Problem Solving through Analysis and Synthesis – Inquiry-driven Analysis and Synthesis.	[6]
Ontologies – Design and Development* Concepts and Instances – Generalization Hierarchies – Object Features – Defining Features – Representation – Transitivity – Inheritance – Concepts as Feature Values – Ontology Matching – Design and Development Methodologies.	[6]
Reasoning with Ontologies and Rules** Production System Architecture – Complex Ontology-based Concepts – Reduction and Synthesis rules and the Inference Engine – Evidence-based hypothesis analysis – Rule and Ontology Matching – Partially Learned Knowledge – Reasoning with Partially Learned Knowledge.	[6]
Learning and Rule Learning* Machine Learning – Concepts – Generalization and Specialization Rules – Types – Formal definition of Generalization. Modelling, Learning and Problem Solving – Rule learning and Refinement – Overview – Rule Generation and Analysis – Hypothesis Learning.	[6]
Practical: 1. Perform operations with Evidence Based Reasoning 2. Perform Evidence based Analysis 3. Perform operations on Probability Based Reasoning 4. Perform Believability Analysis 5. Implement Rule Learning and refinement 6. Implement Rule Learning and refinement 7. Construction of Ontology for a given domain **Tools used: R, Python**	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Gheorghe Tecuci, Dorin Marcu, Mihai Boicu, David A. Schum, “Knowledge Engineering Building Cognitive Assistants for Evidence-based Reasoning”, Cambridge University Press, First Edition, 2016.
2.	Ronald J. Brachman, Hector J. Levesque” Knowledge Representation and Reasoning”, Morgan Kaufmann, 2004.
Reference(s):	
1.	Ela Kumar, Knowledge Engineering, I K International Publisher House, 2018.
2.	John F. Sowa: Knowledge Representation: Logical, Philosophical, and Computational Foundations, Brooks/Cole, Thomson Learning, 2000.
3.	King, Knowledge Management and Organizational Learning, Springer, 2009.
4.	Jay Liebowitz, Knowledge Management Learning from Knowledge Engineering, 1st Edition, 2001.

*SDG 9 – Industry Innovation and Infrastructure

**SDG 4 – Quality Education

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Reasoning Under Uncertainty**	
1.1	Introduction – Abductive reasoning	1
1.2	Probabilistic reasoning: Enumerative Probabilities	1
1.3	Subjective Bayesian view, Belief Functions	1
1.4	Baconian Probability	1
1.5	Fuzzy Probability-Uncertainty methods, Evidence-based reasoning	1
1.6	Intelligent Agent, Mixed-Initiative Reasoning, Knowledge Engineering	1
2	**Methodology and Modeling**	
2.1	Conventional Design and Development	1
2.2	Development tools and Reusable Ontologies	2
2.3	Agent Design and Development using Learning Technology	1
2.4	Problem Solving through Analysis and Synthesis	1
2.5	Inquiry-driven Analysis and Synthesis	1
3	**Ontologies – Design and Development**	
3.1	Concepts and Instances, Generalization Hierarchies	1
3.2	Object Features, Defining Features, Representation	1
3.3	Transitivity, inheritance	1
3.4	Concepts as Feature Values	1
3.5	Ontology Matching	1
3.6	Design and Development Methodologies	1
4	**Reasoning with Ontologies and Rules**	
4.1	Production System Architecture	1
4.2	Complex Ontology-based Concepts, Reduction and Synthesis rules and the Inference Engine	1
4.3	Evidence-based hypothesis analysis	1
4.4	Rule and Ontology Matching	1
4.5	Partially Learned Knowledge	1
4.6	Reasoning with Partially Learned Knowledge	1
5	**Learning and Rule Learning**	
5.1	Machine Learning – Concepts, Generalization and Specialization Rules	1
5.2	Types	1
5.3	Formal definition of Generalization.	1
5.4	Modelling, Learning and Problem Solving	1
5.5	Rule learning and Refinement - Overview	1
5.6	Rule Generation and Analysis, Hypothesis Learning	1
Practical:		
1.	Perform operations with Evidence Based Reasoning	4
2.	Perform Evidence based Analysis	4
3.	Perform operations on Probability Based Reasoning	4
4.	Perform Believability Analysis	4
5.	Implement Rule Learning and refinement	4
6.	Perform analysis based on learned patterns	6
7.	Construction of Ontology for a given domain	4

Course Designer(s)

1. C.Janani - jananic@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM E21	Recommender Systems	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To understand the foundations of the recommender system
- To learn the significance of machine learning and data mining algorithms for Recommender systems
- To learn about collaborative filtering
- To make students design and implement a recommender system
- To learn collaborative filtering

Pre–requisites

- Basic Knowledge of Machine Learning Concepts.

Course Outcomes

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

CO1	Aquire the basic concepts of recommender systems.	Understand
CO2	Apply machine–learning and data–mining algorithms in recommender systems data sets.	Apply
CO3	Apply collaborative filtering to assess the performance of recommender systems using various metrics.	Apply
CO4	Develop and operationalize a straightforward recommender system.	Apply
CO5	Acquire knowledge on the advanced topics of recommender 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	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	2	-	2	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	2	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	2	2	3	-	-	-	-	-	-	-	-	2	-
CO5	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	-	-	-	-	-	-	-
Understand	40	-	20	-	-	50	-
Apply	20	100	40	100	100	50	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E21 – Recommender Systems

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* Introduction and Basic Taxonomy of Recommender Systems – Traditional and Non – Personalized Recommender Systems – Overview of Data Mining Methods for Recommender Systems – Similarity Measures – Dimensionality Reduction – Singular Value Decomposition (SVD).	[6]
Content–Based Recommendation Systems** High – Level Architecture of Content–Based Systems – Item Profiles, Representing Item Profiles, Methods for Learning User Profiles, Similarity – Based Retrieval and Classification Algorithms.	[6]
Collaborative Filtering*** A Systematic Approach, Nearest – Neighbor Collaborative Filtering (CF), User-Based and Item-Based CF, Components of Neighbourhood Methods (Rating Normalization, Similarity Weight Computation and Neighbourhood Selection.	[6]
Attack–Resistant Recommender Systems** Introduction – Types of Attacks – Detecting Attacks on Recommender Systems – Individual Attack – Group Attack – Strategies for Robust Recommender Design – Robust Recommendation Algorithms.	[6]
Evaluating Recommender Systems** Evaluating Paradigms – User Studies – Online and Offline Evaluation – Goals of Evaluation Design – Design Issues – Accuracy Metrics – Limitations of Evaluation Measures.	[6]
Practical: 1. Implement Data similarity measures using Python 2. Implement dimension reduction techniques for recommender systems 3. Implement user profile learning 4. Implement content–based recommendation systems 5. Implement collaborative filter techniques 6. Create an attack for tampering with recommender systems 7. Implement accuracy metrics like Receiver Operated Characteristic curves **Tools used: Python 3.x**	[30]
Total Hours: (Lecture – 30; Practical – 30)	**60**

Text Book(s):	
1.	Charu C. Aggarwal, “Recommender Systems”: The Textbook, Springer, 2016.
2.	Dietmar Jannach, Markus Zanker, Alexander Felfernig and Gerhard Friedrich, “Recommender Systems: An Introduction”, Cambridge University Press (2011), 1st edition.
Reference(s):	
1.	Francesco Ricci, Lior Rokach, Bracha Shapira, Recommender Systems Handbook, 1st ed, Springer (2011).
2.	Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, Mining of massive datasets, 3rd edition, Cambridge University Press, 2020.
3.	Joseph A. Konstan, John Riedl, "Recommender Systems: An Introduction," Cambridge University Press, 2012.
4.	Robin Burke, "Hybrid Recommender Systems: Survey and Experiments," Springer, 2017.

* SDG 4 – Quality Education

**SDG 9 – Industry Innovation and Infrastructure

**SDG 10 – Reduced Inequality

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction**	
1.1	Introduction and Basic Taxonomy of Recommender Systems	1
1.2	Traditional and Non – Personalized Recommender Systems	1
1.3	Overview of Data Mining Methods for Recommender Systems	1
1.4	Similarity measures	1
1.5	Dimensionality reduction	1
1.6	Singular Value Decomposition (SVD)	1
2	**Content–Based Recommendation Systems**	
2.1	High–Level Architecture of Content–Based Systems	1
2.2	Item Profiles	1
2.3	Representing Item Profiles	1
2.4	Methods for Learning User Profiles	1
2.5	Similarity–Based Retrieval	1
2.6	Classification Algorithms	1
3	**Collaborative Filtering**	
3.1	Introduction to Collaborative Filtering	1
3.2	Nearest–Neighbor Collaborative Filtering	1
3.3	User–Based and Item–Based CF	1
3.4	Components of Neighborhood Methods	1
3.5	Rating Normalization Techniques	1
3.6	Similarity Weight Computation Methods, Neighborhood Selection Strategies	1
4	**Attack–Resistant Recommender Systems**	
4.1	Types of Attacks	1
4.2	Detecting Attacks on Recommender Systems	1
4.3	Individual Attack	1
4.4	Group Attack	1
4.5	Strategies for Robust Recommender Design	1
4.6	Robust Recommendation Algorithms	1
5	**Evaluating Recommender Systems**	
5.1	Evaluating Paradigms	1
5.2	User Studies	1
5.3	Online and Offline Evaluation	1
5.4	Goals of Evaluation Design	1
5.5	Design Issues, Accuracy Metrics	1
5.6	Limitations of Evaluation Measures	1
Practical:		
1.	Working with Image Editing tools	4
2.	Working with Audio Editing tools	4
3.	Working with Video Editing and conversion tools	4
4.	Working with web/mobile authoring tools	4
5.	Working with Animation tools	4
6.	Working with E–Learning authoring tools	4
7.	Creating VR and AR applications	6

Course Designer(s)

1. Praveen.K – praveen@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM E22	Cloud Services Management	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To Introduce Cloud Service Management terminology, definition & concepts
- Compare and contrast cloud service management with traditional IT service management
- Identify strategies to reduce risk and eliminate issues associated with adoption of cloud services
- Select appropriate structures for designing, deploying and running cloud-based services in a business environment
- Illustrate the benefits and drive the adoption of cloud-based services to solve real world problems

Pre-requisites

- Basic Understanding of IT Concepts.

Course Outcomes

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

CO1	Gain proficiency in leveraging cloud technologies to automate and develop business solutions.	Understand
CO2	Acquire proficiency in Cloud Service Strategy and Architecture.	Understand
CO3	Employ Cloud services and technologies to solve the real world problems.	Apply
CO4	Analyse cloud service pricing models and cost structures to optimize expenditure of cloud-based solutions.	Analyse
CO5	Develop effective IT and cloud governance frameworks, to assess the impact of cloud services on organizational objectives.	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	3	2	2	-	2	-	-	-	-	-	-	-	2	-	-
CO3	2	2	3	-	3	-	-	-	-	-	-	-	3	-	-
CO4	2	2	-	-	3	-	-	-	-	-	-	-	2	-	-
CO5	2	3	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	-	-	-	-	-	-	-
Understand	60	-	10	-	-	40	-
Apply	-	50	30	50	50	40	50
Analyse	-	50	20	50	50	20	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E22 - Cloud Services Management

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	2	60	3	50	50	100

Cloud Services Management * Cloud Ecosystem - The Essential Characteristics - Basics of Information Technology Service Management and Cloud Service Management - Service Perspectives - Cloud Service Models - Cloud Service Deployment Models.	[6]
Cloud Services Strategy* Cloud Strategy Fundamentals - Cloud Strategy Management Framework - Cloud Policy, Key Driver for Adoption - Risk Management - IT Capacity and Utilization - Demand and Capacity matching - Demand Queueing - Change Management - Cloud Service Architecture.	[6]
Cloud Service LifeCycle and Management ** Cloud Service Reference Model - Cloud Service LifeCycle - Basics of Cloud Service Design - Dealing with Legacy Systems and Services - Benchmarking of Cloud Services - Cloud Service Capacity Planning - Cloud Service Deployment and Migration - Cloud Marketplace - Cloud Service Operations Management.	[6]
Cloud Service Economics* Pricing models for Cloud Services, Freemium, Pay Per Reservation, Pay per User, Subscription based Charging, Procurement of Cloud-based Services - Capex Vs Opex Shift - Cloud service Charging - Cloud Cost Models.	[6]
Cloud Service Governance & Value* IT Governance Definition - Cloud Governance Definition - Cloud Governance Framework - Cloud Governance Structure - Cloud Governance Considerations - Cloud Service Model Risk Matrix - Understanding Value of Cloud Services - Measuring the value of Cloud Services - Balanced Scorecard - Total Cost of Ownership.	[6]
Practical: 1. Create a Cloud Organization in AWS/Google Cloud/or any equivalent Open Source cloud softwares like Openstack, Eucalyptus, OpenNebula with Role-based access control. 2. Create a Cost-model for a web application using various services and do Cost -benefit analysis. 3. Create alerts for usage of Cloud resources. 4. Create Billing alerts for your Cloud Organization. 5. Compare Cloud cost for a simple web application across AWS, Azure and GCP and suggest the best one. 6. Create and manage cloud storage resources by setting Up a Simple Cloud Storage Bucket 7. Implementing Disaster Recovery Strategies for Cloud Services. **Tools used: AWS, Google Cloud, OpenStack, Eucalyptus, OpenNebula**	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):

1.	Enamul Haque, Cloud Service Management and Governance: Smart Service Management in Cloud Era, Enel Publications.
2.	Thomas Erl, Ricardo Puttini, Zaigham Mohammad, Cloud Computing: Concepts, Technology & Architecture, 2013.

Reference(s):

1.	Praveen Ayyappa, Economics of Cloud Computing, LAP Lambert Academic Publishing.
2.	Rajkumar Buyya, Christian Vechhiola, S. Thamarai Selvi, Mastering Cloud Computing Foundations and Applications Programming, 2013.
3.	Thomas Erl, Robert Cope, Amin Naserpour, Cloud Computing Design Patterns
4.	Rajkumar Buyya, James Broberg, and Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", 2011.

*SDG 9 – Industry Innovation and Infrastructure

**SDG 13 – Climate Action

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Cloud Services Management**	
1.1	Cloud Ecosystem -The Essential Characteristics	1
1.2	Basics of Information Technology Service Management (ITSM) and Cloud Service Management	1
1.3	Service Perspectives	1
1.4	Cloud Service Models	2
1.5	Cloud Service Deployment Models	1
2	**Cloud Services Strategy**	
2.1	Cloud Strategy Fundamentals ,Cloud Strategy Management Framework	1
2.2	Cloud Policies, Key Drivers for Adoption	1
2.3	Risk Management, IT Capacity and Utilization	1
2.4	Demand and Capacity Matching	1
2.5	Demand Queueing, Change Management	1
2.6	Cloud Service Architecture	1
3	**Cloud Service LifeCycle and Management**	
3.1	Cloud Service Reference Model, Cloud Service LifeCycle	1
3.2	Basics of Cloud Service Design , Dealing with Legacy Systems and Services	1
3.3	Benchmarking of Cloud Services, Cloud Service Capacity Planning	1
3.4	Cloud Service Deployment and Migration	1
3.5	Cloud Marketplace	1
3.6	Cloud Service Operations Management	1
4	**Cloud Service Economics**	
4.1	Pricing models for Cloud Services	1
4.2	Freemium, Pay Per Reservation, Pay per User	1
4.3	Subscription based Charging, Procurement of Cloud-based Services	1
4.4	Capex Vs Opex Shift	1
4.5	Cloud service Charging - Cloud Cost Models	1
4.6	Overview of Pricing Models for Cloud Services	1
5	**Cloud Service Governance & Value**	
5.1	IT Governance Definition, Cloud Governance Definition	1
5.2	Cloud Governance Framework, Cloud Governance Structure	1
5.3	Considerations for Cloud Governance and Risk Management	1
5.4	Cloud Governance Considerations, Cloud Service Model Risk Matrix	1
5.5	Understanding Value of Cloud Services, Measuring the value of Cloud Services	1
5.6	Balanced Scorecard, Total Cost of Ownership, Defining IT and Cloud Governance	1
Practical:		
1.	Create a Cloud Organization in AWS/Google Cloud/or any equivalent Open Source cloud softwares like Openstack, Eucalyptus, OpenNebula with Role-based access control.	4
2.	Create a Cost-model for a web application using various services and do Cost -benefit analysis.	4
3.	Create alerts for usage of Cloud resources.	4
4.	Create Billing alerts for your Cloud Organization.	4
5.	Compare Cloud cost for a simple web application across AWS, Azure and GCP and suggest the best one.	4
6.	Create and manage cloud storage resources by setting Up a Simple Cloud Storage Bucket	4
7.	Implementing Disaster Recovery Strategies for Cloud Services.	6

Course Designer(s)

1. Praveen.K - praveen@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM E23	Digital and Mobile Forensics	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To understand basic digital forensics and techniques.
- To understand digital crime and investigation.
- To understand how to be prepared for digital forensic readiness.
- To understand and use forensics tools for iOS devices.
- To understand and use forensics tools for Android devices.

Pre-requisites

- Proficiency in Computer Systems and Mobile Operating Systems.

Course Outcomes

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

CO1	Acquire knowledge on digital forensics.	Understand
CO2	Gain Proficiency in digital crime and investigations.	Understand
CO3	Acquire Knowledge on Digital forensic frameworks.	Understand
CO4	Examine, identify, and extract digital evidence from iOS devices.	Apply
CO5	Examine, identify and extract digital evidence from Android 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	-	3	2	-	-	-	-	-	-	-	-	-	2	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	2	3	3	-	-	-	-	-	-	-	-	3	-
CO4	3	-	2	2	3	-	-	-	-	-	-	-	-	3	-
CO5	2	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	-	-	-	-	-	-	-
Understand	60	-	40	-	-	50	-
Apply	-	50	-	50	50	30	50
Analyse	-	50	20	50	50	20	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E23 - Digital and Mobile Forensics

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 Digital Forensics * Forensic Science - Digital Forensics - Digital Evidence - The Digital Forensics Process - Introduction - The Identification Phase - The Collection Phase - The Examination Phase - The Analysis Phase - The Presentation Phase.	[6]
Digital Crime and Investigation * Digital Crime - Substantive Criminal Law - General Conditions - Offenses - Investigation Methods for Collecting Digital Evidence - International Cooperation to Collect Digital Evidence.	[6]
Digital Forensic Readiness ** Introduction - Law Enforcement versus Enterprise Digital Forensic Readiness - Rationale for Digital Forensic Readiness - Frameworks, Standards and Methodologies - Enterprise Digital Forensic Readiness - Challenges in Digital Forensics.	[6]
iOS Forensics ** Mobile Hardware and Operating Systems - iOS Fundamentals - Jailbreaking - File System - Hardware - iPhone Security - iOS Forensics - Procedures and Processes – Tools - Oxygen Forensics - MobilEdit - iCloud.	[6]
Android Forensics ** Android basics - Key Codes - ADB - Rooting Android - Boot Process - File Systems - Security - Tools - Android Forensics - Forensic Procedures - Android Only Tools - Dual Use Tools - Oxygen Forensics - MobilEdit - Android App Decompiling.	[6]
Practical: 1. Installation of Sleuth Kit on Linux. List all data blocks. Analyse allocated as well as unallocated blocks of a disk image. 2. Data extraction from call logs using Sleuth Kit. 3. Data extraction from SMS and contacts using Sleuth Kit. 4. Install Mobile Verification Toolkit or MVT and decrypt encrypted iOS backups. 5. Process and parse records from the iOS system. 6. Extract installed applications from Android devices 7. Extract diagnostic information from Android devices through the adb protocol. 8. Generate a unified chronological timeline of extracted records. **Tools used:** Linux operating system (e.g., Ubuntu, CentOS), Sleuth Kit installed on Linux, Mobile Verification Toolkit (MVT) installed, Android Debug Bridge (ADB)	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Andre Arnes, “Digital Forensics”, Wiley, 2018.
2.	Chuck Easttom, “An In-depth Guide to Mobile Device Forensics”, First Edition, CRC Press, 2022.

Reference(s):	
1.	Cloud Computing Design Patterns by Thomas Erl, Robert Cope, Amin Naserpour.
2.	Vacca, J, Computer Forensics, Computer Crime Scene Investigation, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.
3.	Derrick Donnelly and Sam Brothers, "Digital Forensics: An Introduction", Second Edition, Wiley, 2023.
4.	Brian Carrier, "File System Forensic Analysis", Third Edition, Addison-Wesley, 2024.

*SDG 16 – Peace, Justice, and Strong Institutions

**SDG 9 – Industry, Innovation, and Infrastructure

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Introduction to Digital Forensics**	
1.1	Forensic Science, Digital Forensics	1
1.2	Digital Evidence	1
1.3	The Digital Forensics Process – Introduction	1
1.4	The Identification Phase, The Collection Phases	1
1.5	The Examination Phase, The Analysis Phases	1
1.6	The Presentation Phase	1
2	**Digital Crime and Investigation**	
2.1	Digital Crime	1
2.2	Substantive Criminal Law	1
2.3	General Conditions, Offenses	2
2.4	Investigation Methods for Collecting Digital Evidence	1
2.5	International Cooperation to Collect Digital Evidence	1
3	**Digital Forensic Readiness**	
3.1	Introduction	1
3.2	Law Enforcement versus Enterprise Digital Forensic Readiness	1
3.3	Rationale for Digital Forensic Readiness, Frameworks, Standards and Methodologies	2
3.4	Enterprise Digital Forensic Readiness	1
3.5	Challenges in Digital Forensics	1
4	**iOS Forensics**	
4.1	Mobile Hardware and Operating Systems	1
4.2	iOS Fundamentals, Jailbreaking	1
4.3	File System, Hardware, iPhone Security	1
4.4	iOS Forensics, Procedures and Processes, Tools	1
4.5	Oxygen Forensics	1
4.6	MobilEdit, iCloud	1
5	**Android Forensics**	
5.1	Android Basics, Key Codes	1
5.2	ADB, Rooting Android	1
5.3	Boot Process	1
5.4	File Systems, Security, Tools, Android Forensic	1
5.5	Forensic Procedures, Android Only Tools, Dual Use Tools	1
5.6	Oxygen Forensics, Mobile iEdit, Android App Decompiling	1
Practical:		
1.	Installation of Sleuth Kit on Linux. List all data blocks. Analyse allocated as well as unallocated blocks of a disk image.	4
2.	Data extraction from call logs using Sleuth Kit.	4
3.	Data extraction from SMS and contacts using Sleuth Kit.	4
4.	Install Mobile Verification Toolkit or MVT and decrypt encrypted iOS backups.	2
5.	Process and parse records from the iOS system.	4
6.	Extract installed applications from Android devices.	4
7.	Extract diagnostic information from Android devices through the adb protocol.	4
8.	Generate a unified chronological timeline of extracted records	4

Course Designer(s)

1. Praveen.K - praveen@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM E24	Multimedia and Animation	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To grasp the fundamental knowledge of Multimedia elements and systems.
- To get familiar with Multimedia file formats and standards.
- To learn the process of authoring multimedia presentations.
- To learn the techniques of animation in 2D and 3D and for the mobile UI.
- To explore different popular applications of multimedia.

Pre-requisites

- Basic Knowledge of Design Principles and Visual Storytelling.

Course Outcomes

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

CO1	Acquire Knowledge on Multimedia and its applications.	Understand
CO2	Apply the different types of media elements of different formats on content pages.	Apply
CO3	Develop 2D and 3D interactive and creative presentations for various multimedia applications	Apply
CO4	Apply different standard animation techniques for 2D, 21/2 D, 3D applications.	Apply
CO5	Comprehend the complexities of multimedia applications in cloud computing, security, big data streaming, social networking, and CBIR.	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	2	3	-	-	-	-	-	-	-	-	2	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-	-	2	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	2	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO5	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	30	-	30	-	-	50	-
Apply	30	100	30	100	100	50	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E24 - Multimedia and Animation

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 Multimedia* Definitions - Elements, Multimedia Hardware and Software - Distributed Multimedia Systems - Challenges: Security, Sharing / Distribution, Storage, Retrieval, Processing, Computing. Multimedia Metadata - Multimedia Databases – Hypermedia - Multimedia Learning.	[6]
Multimedia File Formats and Standards** File Formats - Text, Image File Formats, Graphic and Animation File Formats, Digital Audio and Video File Formats, Color in Image and Video, Color Models. - Multimedia Data and File Formats for The Web.	[6]
Multimedia Authoring* Authoring Metaphors - Tools Features and Types: Card and Page Based Tools, Icon and Object Based Tools, Time Based Tools, Cross Platform Authoring Tools, Editing Tools, Painting and Drawing Tools, 3D Modeling and Animation Tools, Image Editing Tools, Audio Editing Tools, Digital Movie Tools, Creating Interactive Presentations - Virtual Learning.	[6]
Animation** Principles Of Animation: Staging, Squash And Stretch, Timing, Onion Skinning, Secondary Action, 2D, 2 ½ D, and 3D Animation - Animation Techniques: Keyframe, Morphing, Inverse Kinematics, Character Rigging, Vector Animation, Stop Motion, Motion Graphics, Fluid Simulation, Skeletal Animation, Skinning Virtual Reality, Augmented Reality.	[6]
Multimedia Applications** Multimedia Big Data Computing - Social Networks, Smart Phones, Surveillance, Analytics, Multimedia Cloud Computing - Multimedia Streaming Cloud - Media on Demand - Security and Forensics - Online Social Networking - Multimedia Ontology - Content Based Retrieval from Digital Libraries.	[6]
Practical: 1. Working with Image Editing tools. (GIMP/ InkScape / Krita / Pencil) 2. Working with Audio Editing tools. (Audacity / Ardour) 3. Working with Video Editing and conversion tools. (OpenShot / Cinelerra / HandBrake) 4. Working with web/mobile authoring tools. (Adapt / KompoZer/ BlueGriffon / BlueFish / Aptana Studio/ NetBeans / WordPress) 5. Working with Animation tools. (Krita, Wick Editor, Blender) 6. Working with E-Learning authoring tools (EdApp / Moovly / CourseLab/ IsEazy and CamStudio/Ampache, VideoLAN) 7. Creating VR and AR applications. (Openspace 3D / ARCore) **Tools used:** All tools listed are open source.	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):

1.	Ze-Nian Li, Mark S. Drew, Jiangchuan Liu, Fundamentals of Multimedia", Third Edition, Springer Texts in Computer Science, 2021. (UNIT-I, II, III)
2.	Steinar Kristoffersen, "Multimedia Networking: Technology, Management, and Applications", John Wiley & Sons, 2nd Edition, 2016.

Reference(s):

1.	John M Blain, The Complete Guide to Blender Graphics: Computer Modeling & Animation, CRC press, 3rd Edition, 2016.
2.	Gerald Friedland, Ramesh Jain, "Multimedia Computing", Cambridge University Press, 2018.
3.	Prabhat K. Andleigh, Kiran Thakrar, "Multimedia System Design", Pearson Education, 1st Edition, 2015.
4.	Mohsen Amini Salehi, Xiangbo Li, "Multimedia Cloud Computing Systems", Springer Nature, 1st Edition, 2021.

*SDG 4 – Quality Education

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

**SDG 9 – Industry, Innovation, and Infrastructure

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of Hours**
1	**Introduction to Multimedia**	
1.1	Definitions – Elements	1
1.2	Multimedia Hardware and Software	1
1.3	Distributed Multimedia Systems - Challenges	1
1.4	Multimedia Metadata and Databases	1
1.5	Hypermedia	1
1.6	Multimedia Learning	1
2	**Multimedia File Formats and Standards**	
2.1	Overview of Multimedia File Formats	1
2.2	Text, Image, and Graphic File Formats	2
2.3	Digital Audio and Video File Formats	1
2.4	Color Models and Multimedia Data for the Web	2
3	**Multimedia Authoring**	
3.1	Authoring Metaphors	1
3.2	Tools Features and Types, Card and Page Based Tools, Icon and Object Based Tools	1
3.3	Time Based Tools, Cross Platform Authoring Tools	1
3.4	Editing Tools, Painting and Drawing Tools, 3D Modeling and Animation Tools	1
3.5	Image Editing Tools, audio Editing Tools, Digital Movie Tools	1
3.6	Creating Interactive Presentations, Virtual Learning, Simulations	1
4	**Animation**	
4.1	Principles Of Animation: Staging, Squash And Stretch, Timing	1
4.2	Onion skinning, secondary action	1
4.3	2D, 2 ½ D and 3D Animation	1
4.4	Animation Techniques: Keyframe, Morphing	1
4.5	Inverse Kinematics, Character Rigging, Vector animation, stop motion, motion graphics, Fluid Simulation	1
4.6	Skeletal Animation, Skinning Virtual Reality, Augmented Reality	1
5	**Multimedia Applications**	
5.1	Multimedia Big Data Computing - Social Networks, Smart Phones, Surveillance, Analytics	1
5.2	Multimedia Cloud Computing - Multimedia Streaming Cloud	1
5.3	Media on Demand, Security and Forensics - Online Social Networking	2
5.4	Multimedia Ontology	1
5.5	Content-Based Retrieval from Digital Libraries	1
Practical:		
1.	Working with Image Editing tools.	4
2.	Working with Audio Editing tools.	4
3.	Working with Video Editing and conversion tools	4
4.	Working with web/mobile authoring tools	4
5.	Working with Animation tools	4
6.	Working with E-Learning authoring tools	4
7.	Creating VR and AR applications	6

Course Designer(s)

1. Praveen.K - praveen@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM E25	Quantum Computing	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To know the background of classical computing and quantum computing.
- To learn the fundamental concepts behind quantum computation.
- To study the details of quantum mechanics and its relation to Computer Science.
- To gain knowledge about the basic hardware and mathematical models of quantum computation.
- To learn the basics of quantum information and the theory behind it.

Pre-requisites

- Basic Understanding of Quantum Mechanics Principles.

Course Outcomes

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

CO1	Acquire Knowledge on the basics of quantum computing.	Understand
CO2	Acquire Knowledge on the background of Quantum Mechanics.	Understand
CO3	Analyse the computation models.	Analyse
CO4	Develop the circuits using quantum computation, environments and frameworks.	Apply
CO5	Gain Insights into the quantum operations such as noise and error–correction.	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	-
CO2	3	2	2	2	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	3	2	-	-	-	-	-	-	-	-	3	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-	-	3	-
CO5	3	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	-	-	-	-	-	-	-
Understand	60	-	20	-	-	30	-
Apply	-	50	30	50	50	40	50
Analyse	-	50	10	50	50	30	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E25 - Quantum Computing

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	2	60	3	50	50	100

Quantum Computing Basic Concepts* Complex Numbers - Linear Algebra - Matrices and Operators - Global Perspectives Postulates of Quantum Mechanics - Quantum Bits - Representations of Qubits - Superpositions.	[6]
Quantum Gates and Circuits** Universal Logic Gates - Basic Single Qubit Gates - Multiple Qubit Gates - Circuit Development - Quantum Error Correction.	[6]
Quantum Algorithms* Quantum Parallelism - Deutsch's Algorithm - The Deutsch–Jozsa Algorithm - Quantum Fourier Transform and its Applications - Quantum Search Algorithms: Grover's Algorithm.	[6]
Quantum Information Theory** Data Compression - Shannon's Noiseless Channel Coding Theorem - Schumacher's Quantum Noiseless Channel Coding Theorem - Classical Information Over Noisy Quantum Channels.	[6]
Quantum Cryptography*** Classical Cryptography Basic Concepts - Private Key Cryptography - Shor's Factoring Algorithm - Quantum Key Distribution - BB84 - Ekart 91.	[6]
Practical: 1. Single qubit gate simulation - Quantum Composer 2. Multiple qubit gate simulation - Quantum Composer 3. Composing simple quantum circuits with q-gates and measuring the output into classical bits. 4. IBM Qiskit Platform Introduction 5. Implementation of Shor's Algorithms 6. Implementation of Grover's Algorithm 7. Implementation of Deutsch's Algorithm 8. Implementation of Deutsch-Jozsa's Algorithm 9. Integer factorization using Shor's Algorithm 10. QKD Simulation **Tools used:** Python, IBM Qiskit, QSim	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Parag K Lala, Mc Graw Hill Education, "Quantum Computing, A Beginners Introduction", First edition (1 November 2020).
2.	Michael A. Nielsen, Issac L. Chuang, "Quantum Computation and Quantum Information", Tenth Edition, Cambridge University Press, 2010.
Reference(s):	
1.	Chris Bernhardt, The MIT Press; Reprint edition (8 September 2020), "Quantum Computing for Everyone".
2.	Scott Aaronson, "Quantum Computing Since Democritus", Cambridge University Press, 2013.
3.	N. David Mermin, "Quantum Computer Science: An Introduction", Cambridge University Press, 2007.
4.	Michael D. Gatley, "Quantum Computing: From Linear Algebra to Physical Realizations", First edition, 2021.

*SDG 4 – Quality Education

**SDG 9 – Industry, Innovation, and Infrastructure

***SDG 16 – Peace, Justice, and Strong Institutions

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of Hours**
1	**Quantum Computing Basic Concepts**	
1.1	Complex Numbers - Linear Algebra	1
1.2	Matrices and Operators	1
1.3	Global Perspectives	1
1.4	Postulates of Quantum Mechanics, Quantum Bits (Qubits)	1
1.5	Representations of Qubits	1
1.6	Superpositions	1
2	**Quantum Gates and Circuits**	
2.1	Universal Logic Gates	1
2.2	Basic Single Qubit Gates	1
2.3	Multiple Qubit Gates	1
2.4	Circuit Development	1
2.5	Quantum Error Correction Techniques	2
3	**Quantum Algorithms**	
3.1	Quantum Parallelism	1
3.2	Deutsch's Algorithm	1
3.3	The Deutsch–Jozsa Algorithm	1
3.4	Quantum Fourier Transform and its Applications	1
3.5	Quantum Search Algorithms	1
3.6	Grover's Algorithm	1
4	**Quantum Information Theory**	
4.1	Data Compression	1
4.2	Shannon's Noiseless Channel Coding Theorem	2
4.3	Schumacher's Quantum Noiseless Channel Coding Theorem	2
4.4	Classical Information over Noisy Quantum Channels	1
5	**Quantum Cryptography**	
5.1	Classical Cryptography Basic Concepts	1
5.2	Private Key Cryptography	1
5.3	Shor's Factoring Algorithm	1
5.4	Quantum Key Distribution (QKD)	1
5.5	BB84 Protocol	1
5.6	Ekert 91	1
Practical:		
1.	Single qubit gate simulation - Quantum Composer	2
2.	Multiple qubit gate simulation - Quantum Composer	2
3.	Composing simple quantum circuits with q-gates and measuring the output into classical bits.	2
4.	IBM Qiskit Platform Introduction	2
5.	Implementation of Shor's Algorithms	4
6.	Implementation of Grover's Algorithm	4
7.	Implementation of Deutsch's Algorithm	4
8.	Implementation of Deutsch-Jozsa's Algorithm	4
9.	Integer factorization using Shor's Algorithm	4
10.	QKD Simulation	2

Course Designer(s)

1. Praveen.K - praveen@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM E26	Soft Computing	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
- To provide the mathematical background for carrying out the optimization associated with neural network learning
- To learn various evolutionary Algorithms
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems
- To introduce case studies utilizing the above and illustrate the Intelligent behaviour of programs based on soft computing

Pre-requisites

- Basic Knowledge of AI Concepts and basic Understanding of Calculus, Statistics.

Course Outcomes

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

CO1	Acquire Knowledge on the fundamentals of fuzzy logic operators and inference mechanisms.	Understand
CO2	Gain Insights into the neural network architecture for AI applications such as classification and clustering.	Understand
CO3	Apply the functionality of Genetic Algorithms in Optimization problems.	Apply
CO4	Apply hybrid techniques involving Neural networks and Fuzzy logic.	Apply
CO5	Apply soft computing techniques in real world 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	-
CO2	2	3	3	2	-	-	-	-	-	-	-	-	-	2	-
CO3	2	3	2	2	3	-	-	-	-	-	-	-	-	3	-
CO4	2	2	2	3	3	-	-	-	-	-	-	-	-	2	-
CO5	2	3	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	-	-	-	-	-	-	-
Understand	60	-	20	-	-	50	-
Apply	-	100	40	100	100	50	100
Analyse	-	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E26 - Soft Computing

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 Soft Computing and Fuzzy Logic* Introduction - Fuzzy Logic - Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Operations on Fuzzy Relations, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems.	[6]
Neural Networks** Supervised Learning Neural Networks - Perceptrons - Backpropagation -Multilayer Perceptrons - Unsupervised Learning Neural Networks - Kohonen Self-Organizing Networks.	[6]
Genetic Algorithms* Chromosome Encoding Schemes - Population Initialization and Selection Methods - Evaluation Function - Genetic Operators - Cross Over - Mutation - Fitness Function - Maximizing Function.	[6]
Neuro Fuzzy Modeling*** ANFIS Architecture - Hybrid Learning - ANFIS As Universal Approximator - Coactive Neuro Fuzzy Modeling - Framework - Neuron Functions for Adaptive Networks - Neuro Fuzzy Spectrum - Analysis of Adaptive Learning Capability.	[6]
Applications ** Modeling a Two-Input Sine Function - Printed Character Recognition - Fuzzy Filtered Neural Networks - Plasma Spectrum Analysis - Hand Written Neural Recognition - Soft Computing for Color Recipe Prediction.	[6]
Practical: 1. Implementation of fuzzy control/ inference system 2. Programming exercise on classification with a discrete perceptron 3. Implementation of XOR with backpropagation algorithm 4. Implementation of self-organizing maps for a specific application 5. Programming exercises on maximizing a function using Genetic algorithm 6. Implementation of two input sine function 7. Implementation of three input Non-linear function **Tools used:** Python or MATLAB.	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):

1.	SaJANG, J. S. R., SUN, C. T., & MIZUTANI, E. (1997). “Neuro-fuzzy and soft computing: A computational approach to learning and machine intelligence”. Upper Saddle River, NJ, Prentice Hall,1997.
2.	Himanshu Singh, Yunis Ahmad Lone, “Deep Neuro-Fuzzy Systems with Python With Case Studies and Applications from the Industry”, Apress, 2020.

Reference(s):

1.	Roj Kaushik and Sunita Tiwari, “Soft Computing-Fundamentals Techniques and Applications”, 1st Edition, McGraw Hill, 2018.
2.	S. Rajasekaran and G. A. V. Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
3.	Samir Roy, Udit Chakraborthy, “Introduction to Soft Computing, Neuro Fuzzy and Genetic Algorithms”, Pearson Education, 2013.
4.	S.N. Sivanandam, S. N. Deepa, “Principles of Soft Computing”, Third Edition, Wiley India Pvt Ltd, 2019.

*SDG 9 – Industry, Innovation, and Infrastructure

**SDG 4 – Quality Education

***SDG 3 – Good Health and Well-being

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of Hours**
1	**Introduction to Soft Computing and Fuzzy Logic**	
1.1	Introduction - Fuzzy Logic	1
1.2	Fuzzy Sets, Membership Functions	1
1.3	Operations on Fuzzy Sets	1
1.4	Fuzzy Relations, Operations on Fuzzy Relations	1
1.5	Fuzzy Rules and Fuzzy Reasoning	1
1.6	Fuzzy Inference Systems	1
2	**Neural Networks**	
2.1	Supervised Learning Neural Networks	1
2.2	Perceptrons, Backpropagation	1
2.3	Multilayer Perceptrons	1
2.4	Unsupervised Learning Neural Networks	1
2.5	Kohonen Self-Organizing Networks	2
3	**Genetic Algorithms**	
3.1	Chromosome Encoding Schemes	1
3.2	Population Initialization and Selection Methods	1
3.3	Evaluation Function, Genetic Operators – Crossover, Mutation	2
3.4	Fitness Function	1
3.5	Maximizing Function	1
4	**Neuro Fuzzy Modeling**	
4.1	ANFIS Architecture	1
4.2	Hybrid Learning - ANFIS As Universal Approximator	1
4.3	Coactive Neuro Fuzzy Modeling, Framework	2
4.4	Neuron functions for Adaptive Networks, Neuro Fuzzy Spectrum	1
4.5	Analysis of Adaptive Learning Capability	1
5	**Applications**	
5.1	Modeling a Two-Input Sine Function	1
5.2	Printed Character Recognition - Fuzzy Filtered Neural Networks	1
5.3	Plasma Spectrum Analysis	2
5.4	Handwritten Neural Recognition	1
5.5	Soft Computing for Color Recipe Prediction	1
Practical:		
1.	Implementation of fuzzy control/ inference system	4
2.	Programming exercise on classification with a discrete perceptron	4
3.	Implementation of XOR with Backpropagation algorithm	4
4.	Implementation of self-organizing maps for a specific application	4
5.	Programming exercises on maximizing a function using Genetic algorithm	4
6.	Implementation of two input sine function	4
7.	Implementation of three input Non-linear function.	6

Course Designer(s)

1. Praveen.K - praveen@ksrct.ac.in

Passed in BoS Meeting held on 02/12/2023

Approved in Academic Council Meeting held on 23/12/2023 BoS Chairman Signature

60 AM E31	Text and Speech Analysis	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- Understand natural language processing basics
- Apply classification algorithms to text documents
- Build question-answering and dialogue systems
- Develop a speech recognition system
- Develop a speech synthesizer

Pre-requisites

- Understanding of Linguistic Concepts, including Syntax and Semantics.

Course Outcomes

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

CO1	Outline the existing and emerging deep learning architectures for text and speech processing.	Understand
CO2	Apply deep learning techniques for NLP tasks, language modelling and machine translation.	Apply
CO3	Outline the relationships and connections in text processing for co-reference and coherence.	Understand
CO4	Apply question-answering systems, chat bots and dialogue systems	Apply
CO5	Apply deep learning models for building speech recognition and text-to-speech systems.	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	-
CO2	3	2	2	3	3	-	-	-	-	-	-	-	-	3	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CO4	2	-	2	2	3	-	-	-	-	-	-	-	-	3	-
CO5	2	3	2	2	3	-	-	-	-	-	-	-	-	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

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

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM E31- Text and Speech Analysis								
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 Natural Language Processing* Foundations of Natural Language Processing - Language Syntax and Structure - Text Preprocessing and Wrangling - Text Tokenization - Stemming - Lemmatization - Removing Stop Words - Feature Engineering for Text Representation - Bag of Words Model - Bag of N-Grams Model - TF - IDF Model	[9]
Text Classification* Vector Semantics and Embedding - Word Embedding - Word2Vec Model - Glove Model – Fast Text Model - Overview of Deep Learning Models - RNN - Transformers - Overview of Text Summarization and Topic Models.	[9]
Question Answering and Dialogue Systems** Information Retrieval - IR - Based Question Answering - Knowledge-Based Question Answering - Language Models For QA - Classic QA Models - Chatbots - Design of Dialogue Systems - Evaluating Dialogue Systems.	[9]
Text-to-Speech Synthesis* Overview. Text Normalization. Letter-to-Sound. Prosody, Evaluation. Signal Processing - Concatenative And Parametric Approaches, Wavenet and Other Deep Learning - Based TTS Systems	[9]
Automatic Speech Recognition** Speech Recognition – Acoustic Modelling – Feature Extraction – Techniques – HMM – DNN Systems.	[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”, Third Edition, 2022
Reference(s):	
1.	Dipanjan Sarkar, Apress, “Text Analytics With Python: A Practical Real-World Approach To Gaining Actionable Insights From Your Data”, 2018.
2.	Tanveer Siddiqui, Tiwary, U. S, Oxford University Press ,“Natural Language Processing And Information Retrieval”, 2008.
3.	Lawrence Rabiner, Biing-Hwang Juang, And B. Yegnanarayana, 1st Edition, Pearson, “Fundamentals Of Speech Recognition” 2009.
4.	Steven Bird, Ewan Klein, And Edward Loper, O’REILLY, “Natural Language Processing with Python”.

*SDG 4 - Quality Education

**SDG 9 - Industry, Innovation, and Infrastructure

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents And Lecture Schedule		
S. No.	**Topics**	**No. Of Hours**
1	**Introduction to Natural Language Processing**	
1.1	Foundations of Natural Language Processing	1
1.2	Language Syntax and Structure	1
1.3	Text Pre-processing and Wrangling	1
1.4	Text Tokenization – Stemming	1
1.5	Lemmatization	1
1.6	Removing Stop words - Feature Engineering for Text Representation	1
1.7	Bag of Words Model	1
1.8	Bag of N-Grams Model	1
1.9	TF- IDF Model	1
2	**Text Classification**	
2.1	Vector Semantics and Embedding	1
2.2	Word Embedding	1
2.3	Word2Vec Model	1
2.4	Glove Model	1
2.5	Fast Text Model -Overview of Deep Learning Models	1
2.6	RNN	1
2.7	Transformers	1
2.8	Overview of Text Summarization and Topic Models	2
3	**Question Answering and Dialogue Systems**	
3.1	Information Retrieval	1
3.2	IR - Based Question Answering	1
3.3	Knowledge-Based Question Answering	1
3.4	Language Models for QA	1
3.5	Classic QA Models	1
3.6	Chatbots	2
3.7	Design of Dialogue Systems	1
3.8	Evaluating Dialogue Systems	1
4	**Text-to-Speech Synthesis**	
4.1	Overview. Text Normalization	1
4.2	Letter-to-Sound	1
4.3	Prosody	1
4.4	Evaluation	1
4.5	Signal Processing	1
4.6	Concatenative and Parametric Approaches	2
4.7	Wavenet and Other Deep Learning - Based TTS Systems	2
5	**Automatic Speech Recognition**	
5.1	Speech Recognition	2
5.2	Acoustic Modelling	2
5.3	Feature Extraction	1
5.4	Techniques	1
5.5	HMM	1
5.6	DNN Systems	2

Course Designer(S)

1. Thamizharasu V -thamizharasu@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E32	UI and UX Design	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To provide a sound knowledge in UI & UX
- To understand the need for UI and UX
- To understand the various Research Methods used in Design
- To explore the various Tools used in UI & UX
- Creating a wireframe and prototype

Pre-requisites

- Knowledge of Fundamental Design Concepts including color theory and layout Principles.

Course Outcomes

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

CO1	Acquire Knowledge on UI and UX.	Understand
CO2	Analyse UX design of any product or application.	Analyse
CO3	Apply UX Skills in product development.	Apply
CO4	Apply Sketching principles.	Apply
CO5	Apply Wireframe and Prototype.	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	2	3	-	3	2	-	-	-	-	-	-	-	2	-	-
CO3	2	3	3	2	2	-	-	-	-	-	-	-	3	-	-
CO4	2	2	3	3	-	-	-	-	-	-	-	-	2	-	-
CO5	2	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	
Remember	-	-	-
Understand	40	30	50
Apply	-	30	30
Analyse	20	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E32- UI and UX Design

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

Designing Essentials * UI vs UX Design - Core Stages of Design Thinking - Divergent and Convergent Thinking - Brainstorming and Game storming - Observational Empathy	[9]
UI Design Foundations* Visual and UI Principles - UI Elements and Patterns - Interaction Behaviours and Principles - Branding - Style Guides	[9]
Empowering Design** Introduction to User Experience – Importance of User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals	[9]
Wire framing, Prototyping and Testing ** Sketching Principles - Sketching Red Routes - Responsive Design – Wire framing - Creating Wire flows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools - Interaction Patterns - Conducting Usability Tests - Other Evaluative User Research Methods - Synthesizing Test Findings - Prototype Iteration	[9]
Research, Designing, Ideating, & Information Architecture ** Identifying and Writing Problem Statements - Identifying Appropriate Research Methods - Creating Personas - Solution Ideation - Creating User Stories - Creating Scenarios - Flow Diagrams – Flow Mapping - Information Architecture	[9]
Total Hours:	45

Text Book(s):

1.	Joel Marsh, O'Reilly "UX for Beginners", 2022.
2.	Jon Yablonski, O'Reilly ,"Laws of UX using Psychology to Design Better Product & Services",2021.

Reference(s):

1.	Jenifer Tidwell, Charles Brewer and Aynne Valencia, O'Reilly ,"Designing Interface" 3rd Edition,2020.
2.	Steve Schoger, Adam Wathan "Refactoring UI", 2018.
3.	Steve Krug, "Don't Make Me Think, Revisited: A Commonsense Approach to Web & Mobile", Third Edition, 2015.
4.	https://www.nngroup.com/articles/
5.	https://www.interaction-design.org/literature.

* SDG – 4 Quality Education.

**SDG – 9 Industry, Innovation, and Infrastructure

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of Hours**
1	**Designing Essentials**	
1.1	UI Vs UX Design	1
1.2	Core Stages of Design Thinking	2
1.3	Divergent and Convergent Thinking	2
1.4	Brainstorming	1
1.5	Game storming	1
1.6	Observational Empathy	2
2	**UI Design Foundations**	
2.1	Visual and UI Principles	2
2.2	UI Elements and Patterns	2
2.3	Interaction Behaviors	1
2.4	Interaction Principles	1
2.5	Branding	1
2.6	Style Guides	2
3	**Empowering Design**	
3.1	Introduction to User Experience	1
3.2	Importance of User Experience	1
3.3	Understanding User Experience	1
3.4	Defining the UX Design Process and its Methodology	2
3.5	Research in User Experience Design	1
3.6	Tools and Method used for Research	1
3.7	User Needs and its Goals	1
3.8	Know about Business Goals	1
4	**Wireframing, Prototyping and Testing**	
4.1	Sketching Principles , Sketching Red Routes	1
4.2	Responsive Design , Wireframing	1
4.3	Creating Wireflows , Building a Prototype	1
4.4	Building High, Fidelity Mockups , Designing Efficiently with Tools	1
4.5	Interaction Patterns	1
4.6	Conducting Usability Tests	1
4.7	Other Evaluative User Research Methods	1
4.8	Synthesizing Test Findings	1
4.9	Prototype Iteration	1
5	**Research, Designing, Ideating, & Information Architecture**	
5.1	Identifying and Writing Problem Statements	1
5.2	Identifying Appropriate Research Methods	1
5.3	Creating Personas	1
5.4	Solution Ideation	1
5.5	Creating User Stories	1
5.6	Creating Scenarios	1
5.7	Flow Diagrams	1
5.8	Flow Mapping	1
5.9	Information Architecture	1

Course Designer(s)

1. Thamizharasu V - thamizharasu@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

60 AM E33	Social Network Security	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To develop semantic web related simple applications
- To explain Privacy and Security issues in Social
- To explain the data extraction and mining of social networks
- To discuss the prediction of human behavior in social communities
- To describe the Access Control, Privacy and Security management of social networks

Pre-requisites

- Understanding of Network Protocols and Security Measures.

Course Outcomes

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

CO1	Develop semantic web related simple applications.	Apply
CO2	Address Privacy and Security issues in Social Networking.	Apply
CO3	Acquire Knowledge on data extraction and mining of social networks.	Understand
CO4	Apply the prediction of human behavior in social communities.	Apply
CO5	Gain insights into the applications of social networks.	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	2	-	-	-	-	-	-	-	2	-	-
CO2	2	2	2	3	3	-	-	-	-	-	-	-	-	2	-
CO3	2	2	-	3	2	-	-	-	-	-	-	-	-	3	-
CO4	3	3	3	3	2	-	-	-	-	-	-	-	-	3	-
CO5	2	3	2	2	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	
Remember	10	-	10
Understand	20	40	50
Apply	30	20	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E33- Social Network Security

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

Fundamentals of Social Networking * Introduction to Semantic Web, Limitations of Current Web, Development of Semantic Web, Emergence of the Social Web, Social Network Analysis, Development of Social Network Analysis, Key Concepts and Measures In Network Analysis, Historical Overview of Privacy and Security, Major Paradigms for Understanding Privacy and Security.	[9]
Security Issues in Social Networks ** The Evolution of Privacy And Security Concerns With Networked Technologies, Contextual Influences on Privacy Attitudes and Behaviors, Anonymity In a Networked World.	[9]
Extraction and Mining in Social Networking * Extracting Evolution of Web Community from a Series of Web Archive, Detecting Communities in Social Networks, Definition of Community, Evaluating Communities, Methods for Community Detection and Mining, Applications of Community Mining Algorithms, Tools for Detecting Communities Social Network Infrastructures and Communities, Big Data and Privacy.	[9]
Predicting Human Behavior and Privacy Issues* Understanding and Predicting Human Behavior For Social Communities, User Data Management, Inference and Distribution, Enabling New Human Experiences, Reality Mining, Context, Awareness, Privacy in Online Social Networks, Trust in Online Environment, What Is Neo4j, Nodes, Relationships, Properties.	[9]
Access Control, Privacy and Identity Management** Understand the Access Control Requirements for Social Network, Enforcing Access Control Strategies, Authentication and Authorization, Roles-Based Access Control, Host, Storage and Network Access Control Options, Firewalls, Authentication, and Authorization In Social Network, Identity & Access Management, Single Sign-On, Identity Federation, Identity Providers and Service Consumers, The Role of Identity Provisioning.	[9]
Total Hours:	**45**

Text Book(s):

1.	Peter Mika, Springer, "Social Networks and the Semantic Web", First Edition, 2007.
2.	BorkoFurht, Springer, "Handbook of Social Network Technologies and Application, First Edition, 2010.

Reference(s):

1.	Easley D. Kleinberg J., "Press, Networks, Crowds, and Markets -Reasoning about a Highly Connected World", Cambridge University , 2010.
2.	Guandong Xu, Yanchun Zhang and Lin Li, "Web Mining and Social Networking - Techniques and applications Ⅱ", First Edition, Springer, 2011.
3.	Max Chevalier, Christine Julien and Chantal Soulé-Dupuy,"Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modeling Ⅱ", IGI Global Snippet, 2009.
4.	John G. Breslin, Alexander Passant and Stefan Decker, Springer "The Social Semantic Web", 2009.

* SDG 10 - Reduced Inequalities

**SDG 11 - Sustainable Cities and Communities

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents And Lecture Schedule		
S. No.	**Topics**	**No. Of Hours**
1	**Fundamentals of Social Networking**	
1.1	Introduction to Semantic Web, Limitations of Current Web	1
1.2	Development of Semantic Web	1
1.3	Emergence of the Social Web	1
1.4	Social Network Analysis	1
1.5	Development of Social Network Analysis	1
1.6	Key Concepts and Measures in Network Analysis	1
1.7	Historical Overview of Privacy and Security	1
1.8	Major Paradigms for Understanding Privacy and Security	2
2	**Security Issues in Social Networks**	
2.1	The Evolution of Privacy and Security Concerns with Networked Technologies	3
2.2	Contextual Influences on Privacy Attitudes and Behaviors	3
2.3	Anonymity in a Networked World	3
3	**Extraction and Mining in Social Networking**	
3.1	Extracting Evolution of Web Community from a Series of Web Archive	1
3.2	Detecting Communities in Social Networks	1
3.3	Definition of Community	1
3.4	Evaluating Communities	1
3.5	Methods for Community Detection and Mining	1
3.6	Applications of Community Mining Algorithms	1
3.7	Tools for Detecting Communities Social Network Infrastructures and Communities	2
3.8	Big Data and Privacy	1
4	**Predicting Human Behavior and Privacy Issues**	
4.1	Understanding and Predicting Human Behavior for Social Communities	1
4.2	User Data Management	1
4.3	Inference and Distribution	1
4.4	Enabling New Human Experiences	1
4.5	Reality Mining	1
4.6	Context, Awareness, Privacy in Online Social Networks	1
4.7	Trust in Online Environment	1
4.8	What is Neo4j, Nodes	1
4.9	Relationships, Properties	1
5	**Access Control, Privacy and Identity Management**	
5.1	Understand the Access Control Requirements for Social Network	1
5.2	Enforcing Access Control Strategies	1
5.3	Authentication and Authorization	1
5.4	Roles-Based Access Control	1
5.5	Host, Storage and Network Access Control Options	1
5.6	Firewalls, Authentication, and Authorization In Social Network	1
5.7	Identity & Access Management	1
5.8	Single Sign-on, Identity Federation	1
5.9	Identity Providers and Service Consumers, The Role of Identity Provisioning	1

Course Designer(S)

1.Thamizharasu V - thamizharasu@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E34	Video Creation and Editing	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To introduce the broad perspective of linear and nonlinear editing concepts
- To understand the concept of Storytelling styles
- To be familiar with audio and video recording
- To apply different media tools
- To learn and understand the concepts of AVID XPRESS DV 4

Pre-requisites

- Proficiency in Video Editing Software.

Course Outcomes

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

CO1	Outline the strengths and limitations of Nonlinear editing.	Understand
CO2	Design the infrastructure and significance of storytelling.	Apply
CO3	Apply suitable methods for recording to CDs and VCDs.	Apply
CO4	Delving into the advanced editing and training techniques requires a nuanced understanding of their core principles.	Remember
CO5	Design and develop projects using AVID XPRESS DV 4.	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	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO3	2	2	3	3	-	-	-	-	-	-	-	-	2	-	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	2	-	-
CO5	2	2	3	2	3	-	-	-	-	-	-	-	3	-	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

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

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E - CSE (Artificial Intelligence and Machine Learning)								
60 AM E34 - Video Creation and Editing								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Fundamentals * Evolution of Filmmaking - Linear Editing - Non-Linear Digital Video - Economy of Expression – Risks Associated with Altering Reality Through Editing.	[9]
Storytelling* Storytelling Styles in a Digital World Through Jump Cuts, L-Cuts, Match Cuts, Cutaways, Dissolves, Split Edits - Consumer and Pro Nle Systems - Digitizing Images - Managing Resolutions - Mechanics of Digital Editing - Pointer Files - Media Management.	[9]
Using Audio and Video* Capturing Digital and Analog Video, Importing Audio, Putting Video on, Exporting Digital Video to Tape ,Recording to CDs And VCDs.	[9]
Working with Canva Studio ** Introduction to Canva Studio – Basic Editing in Canva Studio – Advanced Editing Techniques – Working with Audio – Using Media Tools – Viewing and setting preferences.	[9]
Working with Filmora ** Getting started with Filmora – Recording and Importing Files – Organizing and Editing Footage – Working with Audio – Output Options.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Keith Underdahl, Dummy Series, “Digital Video for Dummies”, Fourth Edition, 2006.
2.	Robert M. Goodman and Partick McGarth, McGraw – Hill, “Editing Digital Video: The Complete Creative and Technical Guide”, Digital Video and Audio, 2003.
Reference(s):	
1.	Avid Xpress DV 4 User Guide, 2007.
2.	Final Cut Pro 6 User Manual, 2004.

* SDG - 4 Quality Education

**SDG - 12 Responsible Consumption and Production

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents And Lecture Schedule		
S. No.	**Topics**	**No. Of Hours**
1	**Fundamentals**	
1.1	Evolution of Filmmaking	1
1.2	Linear Editing	2
1.3	Non-Linear Digital Video	2
1.4	Economy of Expression	2
1.5	Risks Associated with Altering Reality Through Editing.	2
2	**Storytelling**	
2.1	Storytelling Styles in a Digital World Through Jump Cuts, L-Cuts, Match Cuts	1
2.2	Cutaways	1
2.3	Dissolves	1
2.4	Split Edits	1
2.5	Digitizing Images	1
2.6	Managing Resolutions	1
2.7	Mechanics of Digital Editing	1
2.8	Pointer Files	1
2.9	Media Management	1
3	**Using Audio and Video**	
3.1	Capturing Digital	1
3.2	Analog Video	2
3.3	Importing Audio	1
3.4	Putting Video On	2
3.5	Exporting Digital Video To Tape	1
3.6	Recording to CDs and VCDs	2
4	**Working with Canva Studio**	
4.1	Introduction to Canva Studio	1
4.2	Basic Editing in Canva Studio	2
4.3	Advanced Editing Techniques	2
4.4	Working with Audio	1
4.5	Using Media Tools	2
4.6	Viewing and setting preferences	1
5	**Working with Filmora**	
5.1	Getting started with Filmora	1
5.2	Recording and Importing Files	2
5.3	Organizing	2
5.4	Editing Footage	2
5.5	Working with Audio	1
5.6	Output Options	1

Course Designer(S)

1. Thamizharasu V - thamizharasu@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E35	Cryptocurrency and Blockchain Technologies	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the basics of Blockchain
- To learn Different protocols and consensus algorithms in Blockchain
- To learn the Blockchain implementation frameworks
- To understand the Blockchain Applications
- To experiment the Hyperledger Fabric, Ethereum networks.

Pre-requisites

- Basic Understanding of Cryptographic Principles.

Course Outcomes

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

CO1	Identify emerging abstract models for Blockchain Technology.	Remember
CO2	Acquire Knowledge on major research challenges and technical gaps existing between theory and practice in the crypto currency domain.	Understand
CO3	Acquire Knowledge on Bitcoin Consensus and algorithms.	Undertand
CO4	Apply hyper ledger Fabric and Ethereum platform to implement the Block chain Application.	Apply
CO5	Apply the tools which helps in solving social requirements	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	3	3	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	2	2	-	-	-	-	-	-	-	3	-	-
CO4	3	2	3	2	3	-	-	-	-	-	-	-	3	-	-
CO5	2	3	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	30	-	30
Understand	30	30	40
Apply	-	30	30
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E35 - Cryptocurrency And Blockchain Technologies

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 Blockchain Blockchain - Public Ledgers, Blockchain As Public Ledgers - Block In A Blockchain, Transactions - The Chain And The Longest Chain - Permissioned Model Of Blockchain, Cryptographic - Hash Function, Properties Of A Hash Function - Hash Pointer And Merkle Tree.	[9]
Bitcoin and Cryptocurrency A Basic Crypto Currency, Creation Of Coins, Payments And Double Spending, Forth - The Precursor For Bitcoin Scripting, Bitcoin Scripts , Bitcoin P2p Network, Transaction In Bitcoin Network, Block Mining, Block Propagation And Block Relay.	[9]
Bitcoin Consensus Bitcoin Consensus, Proof Of Work (Pow) - Hashcash Pow , Bitcoin Pow, Attacks On Pow ,Monopoly Problem - Proof Of Stake - Proof Of Burn - Proof Of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool - Permissioned Model And Use Cases.	[9]
Hyperledger Fabric & Ethereum Architecture Of Hyperledger Fabric V1.1 - Chain Code - Ethereum: Ethereum Network, Evm, Transaction Fee, Mist Browser, Ether, Gas, Solidity.	[9]
Blockchain Applications Smart Contracts, Truffle Design and Issue - DApps - Nft. Blockchain Applications In Supply Chain Management, Logistics, Smart Cities, Finance And Banking, Insurance, etc- Case Study.	[9]
Total Hours:	**45**

Text Book(s):

1.	Bashir and Imran, Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks, 2017
2.	Andreas Antonopoulos, O'Reilly, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", 2014.

Reference(s):

1.	Daniel Drescher, Apress, "Blockchain Basics", First Edition, 2017.
2.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder, Princeton University Press, Bitcoin and cryptocurrency technologies: a comprehensive introduction,2016.
3.	Ritesh Modi, Packt Publishing, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Blockchain".
4.	Handbook of Research on Blockchain Technology, published by Elsevier Inc. ISBN: 9780128198162, 2020

* SDG 8 - Decent Work and Economic Growth.

**SDG 10 - Reduced Inequalities

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents And Lecture Schedule		
S. No.	**Topics**	**No. Of Hours**
1	**Introduction to Blockchain**	
1.1	Blockchain , Public Ledgers, Blockchain as Public Ledgers	1
1.2	Block in s Blockchain, Transactions the Chain and The Longest Chain	1
1.3	Permissioned Model of Blockchain	1
1.4	Cryptographic - Hash Function, Properties of a Hash Function	1
1.5	Hash Pointer	1
1.6	Merkle Tree	1
2	**Bitcoin and Cryptocurrency**	
2.1	A Basic Crypto Currency, Creation of Coins	1
2.2	Payments and Double Spending, FORTH	1
2.3	The Precursor for Bitcoin Scripting, Bitcoin Scripts	1
2.4	Bitcoin P2p Network	1
2.5	Transaction in Bitcoin Network	1
2.6	Block Mining, Block Propagation and Block Relay	1
3	**Bitcoin Consensus**	
3.1	Bitcoin Consensus, Proof of Work (Pow)	1
3.2	Hashcash Pow , Bitcoin Pow	1
3.3	Attacks on Pow ,Monopoly Problem	1
3.4	Proof of Stake- Proof of Burn - Proof of Elapsed Time	1
3.5	Bitcoin Miner, Mining Difficulty	1
3.6	Mining Pool-Permissioned Model and Use Cases	1
4	**Hyperledger Fabric & Ethereum**	
4.1	Architecture of Hyperledger Fabric V1.1, Chain Code	1
4.2	Ethereum: Ethereum Network,	1
4.3	EVM	1
4.4	Transaction Fee, Mist Browser	1
4.5	Ether, Gas, Solidity	1
4.6	Handling Several Batches	1
5	**Blockchain Applications**	
5.1	Smart Contracts, Truffle Design and Issue	1
5.2	Dapps- Nft	1
5.3	Blockchain Applications In Supply Chain Management	1
5.4	Logistics, Smart Cities,	1
5.5	Finance and Banking, Insurance	1
5.6	Etc- Case Study.	1
Practical:		
1.	Write a basic Solidity smart contract that demonstrates simple functionality.	10
2.	Create and deploy a custom token using Solidity and interact with it.	10
3.	Develop a decentralized application (DApp) using Truffle framework and Ganache for local blockchain testing	10

Course Designer(S)

1.Thamizharasu V - thamizharasu@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E36	Game Theory	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 41 modelling applications
- 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
- To apply game theory in searching, auctioning and trading

Pre-requisites

- Foundation in Probability and Statistics Concepts.

Course Outcomes

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

CO1	Outline the notion of a strategic game and equilibria and identify the characteristics of main applications of these concepts.	Remember
CO2	Comprehend the use of Nash Equilibrium for other problems.	Understand
CO3	Identify key strategic aspects and connect them to relevant game theoretic concepts in a real-world scenario.	Remember
CO4	Identify some applications that need aspects of Bayesian Games.	Remember
CO5	Develop a typical Virtual Business scenario using Game 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	2	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CO5	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	
Remember	30	60	40
Understand	30	-	30
Apply	-	-	30
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM E36 - Game Theory								
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 * 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 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 * Strategic Games - Prisoner's Dilemma, Matching Pennies - Nash Equilibria - Mixed Strategy Equilibrium - Zero-Sum Games	[9]
Games with Imperfect Information* Bayesian Games - Motivational Examples - General Definitions - Information Aspects - Illustrations - Extensive Games with Imperfect - Information - Strategies - Nash Equilibrium - Repeated Games - The Prisoner's Dilemma - Bargaining	[9]
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.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Osborne, M. J, Oxford University Press, “An Introduction to Game Theory”, 2012.
2.	Machler, M, Solan, E, and Zamir, S. Cambridge University Press, “Game Theory”, 2013.
Reference(s):	
1.	Nisan, N., Roughgarden, T., Tardos, E. and Vazirani, V.V, Cambridge University Press, “Algorithmic Game Theory”, 2007.
2.	Dixit, A. and Skeath, S., W W Norton & Co Inc, “Games of Strategy”, Second Edition. 2004.
3.	Zhu Han, DusitNiyato, WalidSaad, TamerBasar and Are Hjorungnes, Cambridge University Press ,“Game Theory in Wireless and Communication Networks”, 2012.
4.	William Spaniel, CreateSpace Independent Publishing, “Game Theory 101: The Complete Textbook”, 2011.

* SDG - 4 Quality Education

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents And Lecture Schedule		
S. No.	**Topics**	**No. of Hours**
1	**Introduction**	
1.1	Making Rational Choices: Basics of Games , Strategy , Preferences , Payoffs	1
1.2	Mathematical Basics	1
1.3	Game Theory	1
1.4	Rational Choice	1
1.5	Basic Solution Concepts	1
1.6	Non- Cooperative Versus Cooperative Games	1
1.7	Basic Computational Issues	1
1.8	Finding Equilibria Learning in Games	1
1.9	Typical Application Areas for Game Theory	1
2	**Games with Perfect Information**	
2.1	Strategic Games	1
2.2	Prisoner's Dilemma	2
2.3	Matching Pennies	2
2.4	Nash Equilibria	2
2.5	Mixed Strategy Equilibrium	1
2.6	Zero-Sum Games	1
3	**Games with Imperfect Information**	
3.1	Bayesian Games , Motivational Examples	1
3.2	General Definitions	1
3.3	Information Aspects	1
3.4	Illustrations , Extensive Games with Imperfect Information	1
3.5	Strategies	1
3.6	Nash Equilibrium	1
3.7	Repeated Games	1
3.8	The Prisoner's Dilemma	1
3.9	Bargaining	1
4	**Non-Cooperative Game Theory**	
4.1	Self-Interested Agents.	1
4.2	Games in Normal Form	1
4.3	Analyzing Games: From Optimality to Equilibrium	1
4.4	Computing Solution Concepts of Normal Form Games	1
4.5	Computing Nash Equilibria of Two-Player	1
4.6	Zero-Sum Games	1
4.7	Computing Nash Equilibria of Two-Player,	1
4.8	General-Sum Games	1
4.9	Identifying Dominated Strategies	1
5	**Mechanism Design**	
5.1	Aggregating Preferences	1
5.2	Social Choice	1
5.3	Formal Model	1
5.4	Voting	1
5.5	Existence of Social Functions	1
5.6	Ranking Systems	1
5.7	Mechanism Design	2
5.8	Mechanism Design with Unrestricted Preferences.	1

Course Designer(S)

1. C. Janani - jananic@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E41	Business Analytics	Category	L	T	P	Credit
		PE	1	0	4	3

Objectives

- To understand the Analytics Life Cycle
- To comprehend the process of acquiring Business Intelligence
- To understand various types of analytics for Business Forecasting
- To model the supply chain management for Analytics
- To apply analytics for different functions of a business

Prerequisite

- Proficiency in Python and SQL.

Course Outcomes

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

CO1	Acquire knowledge on the real world business problems and model with analytical solutions.	Understand
CO2	Analyse the business processes for extracting Business Intelligence.	Analyse
CO3	Apply predictive analytics for business fore-casting.	Apply
CO4	Apply analytics for supply chain and logistics management.	Apply
CO5	Apply analytics for marketing and sales.	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	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	2	3	-	-	-	-	-	-	-	-	3	-
CO3	2	2	3	3	3	-	-	-	-	-	-	-	-	3	-
CO4	2	-	-	2	3	-	-	-	-	-	-	-	-	2	-
CO5	2	3	2	3	2	-	-	-	-	-	-	-	-	3	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	-	10	-	-
Understand	40	20	40	-
Apply	-	30	40	50
Analyse	20	-	20	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E- CSE (Artificial Intelligence and Machine Learning)								
60 AM E41- Business Analytics								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	1	0	4	75	3	50	50	100

Introduction to Business Analytics * Analytics and Data Science – Analytics Life Cycle – Types of Analytics – Business Problem Definition – Data Collection – Data Preparation – Hypothesis Generation – Modeling – Validation and Evaluation – Interpretation – Deployment and Iteration	[3+12]
Business Intelligence* Data Warehouses and Data Mart - Knowledge Management –Types of Decisions - Decision Making Process - Decision Support Systems – Business Intelligence – OLAP – Analytic functions	[3+12]
Business Forecasting* Introduction to Business Forecasting and Predictive analytics - Logic and Data Driven Models – Data Mining and Predictive Analysis Modelling – Machine Learning for Predictive analytics	[3+12]
Hr & Supply Chain Analytics* Human Resources – Planning and Recruitment – Training and Development - Supply chain network - Planning Demand, Inventory and Supply – Logistics – Analytics applications in HR & Supply Chain - Applying HR Analytics to make a prediction of the demand for hourly employees for a year.	[3+12]
Marketing & Sales Analytics * Marketing Strategy, Marketing Mix, Customer Behaviour –selling Process – Sales Planning – Analytics applications in Marketing and Sales - predictive analytics for customers' behaviour in marketing and sales.	[3+12]
Total Hours:	**75**

Text Book(s):	
1.	R.Evans James, “Business Analytics”, 2nd Edition, Pearson, 2017
2.	R N Prasad, Seema Acharya, “Fundamentals of Business Analytics”, 2nd Edition, Wiley, 2016
Reference(s):	
1.	Philip Kotler and Kevin Keller, “Marketing Management”, 15th edition, PHI, 2016
2.	VSP RAO, “Human Resource Management”, 3rd Edition, Excel Books, 2010.
3.	Mahadevan B, “Operations Management -Theory and Practice”,3rd Edition, Pearson Education,2018

*****SDG 4 – Quality Education

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Introduction To Business Analytics**	
1.1	Analytics and Data Science , Analytics Life Cycle , Types of Analytics	1
1.2	Business Problem Definition , Data Collection , Data Preparation , Hypothesis Generation	1
1.3	Modeling , Validation and Evaluation , Interpretation, Deployment and Iteration	1
2	**Business Intelligence**	
2.1	Data Warehouses and Data Mart , Knowledge Management	1
2.2	Types of Decisions , Decision Making Process , Decision Support Systems	1
2.3	Business Intelligence , OLAP , Analytic functions	1
3	**Business Forecasting**	
3.1	Introduction to Business Forecasting and Predictive analytics	1
3.2	Logic and Data Driven Models , Data Mining and Predictive Analysis Modelling	1
3.3	Machine Learning for Predictive analytics	1
4	**HR & Supply Chain Analytics**	
4.1	Human Resources , Planning and Recruitment , Training and Development , Supply chain network	1
4.2	Planning Demand, Inventory and Supply , Logistics , Analytics applications in HR & Supply Chain	1
4.3	Applying HR Analytics to make a prediction of the demand for hourly employees for a year	1
5	**Marketing & Sales Analytics**	
5.1	Marketing Strategy, Marketing Mix, Customer Behaviour	1
5.2	selling Process , Sales Planning , Analytics applications in Marketing and Sales	1
5.3	predictive analytics for customers' behaviour in marketing and sales	1
6	**Project**	
6.1	Problem Identification	10
6.2	Solution for Problem	15
6.3	Implementation	20
6.4	Presentation	05
6.5	Report	05
6.6	Demo	05

Course Designer(s)

1. Mr.V.Thamizharasu - thamizharasu@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E42	Web Application Security	Category	L	T	P	Credit
		PE	1	0	4	3

Objectives

- To understand the fundamentals of web application security
- To focus on wide aspects of secure development and deployment of web applications
- To learn how to build secure APIs
- To learn the basics of vulnerability assessment and penetration testing
- To get an insight about Hacking techniques and Tools

Prerequisite

- Basic Understanding of Web Technology.

Course Outcomes

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

CO1	Acquire the basic concepts of web application security and the need for it.	Understand
CO2	Apply the process for secure development and deployment of web applications.	Apply
CO3	Acquire the skill to design and develop Secure Web Applications that use Secure APIs.	Apply
CO4	Analyse the importance of carrying out vulnerability assessment and penetration testing.	Analyse
CO5	Apply the skill to think like a hacker and to use hacker's tool sets.	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	-	3	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	3	-	-	-	-	-	-	-	2	-	-
CO4	2	2	-	-	3	-	-	-	-	-	-	-	3	-	-
CO5	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)
	1	2		
Remember	-	-	-	-
Understand	40	30	40	-
Apply	20	20	40	50
Analyse	-	10	20	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E- CSE (Artificial Intelligence and Machine Learning)

60 AM E42 - Web Application Security

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	1	0	4	75	3	50	50	100

Fundamentals of Web Application Security* The history of Software Security - Recognizing Web Application Security Threats, Web Application Security, Authentication and Authorization, , Session Management - Input Validation.	[3+12]
Secure Development and Deployment * Web Applications Security - Security Testing, Security Incident Response Planning, The Microsoft Security Development Lifecycle (SDL), OWASP Comprehensive Lightweight Application Security Process (CLASP), The Software Assurance Maturity Model (SAMM).	[3+12]
Secure API Development * API Security- Session Cookies, Token Based Authentication, Securing Natter APIs: Addressing threats with Security Controls, Rate Limiting for Availability, Encryption, Audit logging, Securing service-to-service APIs: API Keys, Securing Micro service APIs: Service Mesh, Locking Down Network Connections, Securing Incoming Requests.	[3+12]
Vulnerability Assessment and Penetration Testing * Vulnerability Assessment Lifecycle, Vulnerability Assessment Tools: Cloud-based vulnerability scanners, Host-based vulnerability scanners, Network-based vulnerability scanners, Database based vulnerability scanners, Types of Penetration Tests: External Testing, Web Application Testing, SSID or Wireless Testing, Mobile Application Testing.	[3+12]
Hacking Techniques and Tools * Social Engineering, Injection, Cross-Site Scripting(XSS), Broken Authentication and Session Management, Cross-Site Request Forgery, Security Misconfiguration, Insecure Cryptographic Storage, Failure to Restrict URL Access, Tools: Comodo, OpenVAS, Nexpose, Nikto, Burp Suite, etc.	[3+12]
Total Hours:	**75**

Text Book(s):

1.	Andrew Hoffman, Web Application Security: Exploitation and Countermeasures for Modern Web Applications, First Edition, 2020, O'Reilly Media, Inc..
2.	Bryan Sullivan, Vincent Liu, Web Application Security: A Beginners Guide, 2012, The McGraw-Hill Companies.
3.	Neil Madden, API Security in Action, 2020, Manning Publications Co., NY, USA.

Reference(s):

1.	Michael Cross, Developer's Guide to Web Application Security, 2007, Syngress Publishing, Inc.
2.	Ravi Das and Greg Johnson, Testing and Securing Web Applications, 2021, Taylor & Francis Group, LLC.
3.	Prabath Siriwardena, Advanced API Security, 2020, Apress Media LLC, USA
4.	Malcom McDonald, Web Security for Developers, 2020, No Starch Press, Inc.
5.	Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, and Terron Williams Grey Hat Hacking: The Ethical Hacker's Handbook, Third Edition, 2011, The McGraw-Hill Companies

*****SDG 9 – Industrial ,Innovation and Infrastructure

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Fundamentals of Web Application Security**	
1.1	The history of Software Security, Recognizing Web Application Security Threats	1
1.2	Web Application Security, Authentication and Authorization	1
1.3	Session Management , Input Validation	1
2	**Secure Development and Deployment**	
2.1	Web Applications Security - Security Testing, Security Incident Response Planning	1
2.2	The Microsoft Security Development Lifecycle (SDL), OWASP Comprehensive Lightweight Application Security Process (CLASP)	1
2.3	The Software Assurance Maturity Model (SAMM)	1
3	**Secure API Development**	
3.1	API Security- Session Cookies, Token Based Authentication, Securing Natter APIs: Addressing threats with Security Controls	1
3.2	Rate Limiting for Availability, Encryption, Audit logging, Securing service-to-service APIs: API Keys , OAuth2	1
3.3	Securing Micro service APIs: Service Mesh, Locking Down Network Connections, Securing Incoming Requests	1
4	**Vulnerability Assessment And Penetration Testing**	
4.1	Vulnerability Assessment Lifecycle, Vulnerability Assessment Tools: Cloud-based vulnerability scanners, Host-based vulnerability scanners	1
4.2	Network-based vulnerability scanners, Database based vulnerability Scanners, Types of Penetration Tests: External Testing, Web Application Testing	1
4.3	SSID or Wireless Testing, Mobile Application Testing	1
5	**Hacking Techniques And Tools**	
5.1	Social Engineering, Injection, Cross-Site Scripting(XSS), Broken Authentication and Session Management	1
5.2	Cross-Site Request Forgery, Security Misconfiguration, Insecure Cryptographic Storage, Failure to Restrict URL Access	1
5.3	Tools: Comodo, OpenVAS, Nexpose, Nikto, Burp Suite, etc	1
6	**Project**	
6.1	Problem Identification	10
6.2	Solution for Problem	15
6.3	Implementation	20
6.4	Presentation	05
6.5	Report	05
6.6	Demo	05

Course Designer(s)

1. Mr.V.Thamizharasu - thamizharasu@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E43	Modern Cryptography	Category	L	T	P	Credit
		PE	1	0	4	3

Objectives

- To learn about Modern Cryptography
- To focus on how cryptographic algorithms and protocols work and how to use them
- To build a pseudorandom permutation
- To construct Basic cryptanalytic techniques
- To provide instruction on how to use the concepts of block ciphers and message authentication codes

Prerequisite

- Basic Understanding of Cryptographic Algorithms.

Course Outcomes

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

CO1	Acquire knowledge on the basic principles of cryptography and general cryptanalysis.	Understand
CO2	Apply the concepts of symmetric encryption and authentication.	Apply
CO3	Acquire knowledge on the public key encryption, digital signatures and key establishment.	Understand
CO4	Articulate the cryptographic algorithms to compose, build and Analyse simple cryptographic solutions.	Analyse
CO5	Apply Message Authentication Codes.	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	-	-
CO2	2	3	2	-	2	-	-	-	-	-	-	-	2	-	-
CO3	2	2	2	3	2	-	-	-	-	-	-	-	2	-	-
CO4	3	2	2	-	3	-	-	-	-	-	-	-	3	-	-
CO5	2	3	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)
	1	2		
Remember	-	-	-	-
Understand	30	30	40	-
Apply	30	20	40	50
Analyse	-	10	20	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E - CSE (Artificial Intelligence and Machine Learning)

60 AM E43 - Modern Cryptography

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	1	0	4	75	3	50	50	100

Introduction * Basics of Symmetric Key and Asymmetric Key Cryptography, Hardness of Functions. Notions of Semantic Security (SS) and Message in distinguishability (MI): Proof of Equivalence of SS and MI, Hard Core Predicate, Trap-Door Permutation, Gold wasser-Micali Encryption.	[3+12]
Formal Notions of Attacks ** Attacks Under Message In distinguishability: Chosen Plaintext Attack (IND-CPA), Chosen Cipher text Attacks (IND-CCA1 and IND-CCA2), Attacks Under Message Non-Malleability: NM-CPA and NM-CCA2, Inter-Relations Among the Attack Model.	[3+12]
Random Oracles * Provable Security and Asymmetric Cryptography, Hash Functions. One-Way Functions: Weak and Strong One-Way Functions. Pseudo-Random Generators (PRG): Blum - Micali -Yao Construction, Construction of More Powerful PRG.	[3+12]
Building a Pseudorandom Permutation *** The Luby Rackoff Construction: Formal Definition, Application of the Luby Rackoff Construction to the Construction of Block Ciphers, The Des in the Light of Luby Rackoff Construction.	[3+12]
Message Authentication Codes ** Left or Right Security (LOR), Using a PRF as a MAC, Variable Length MAC. Public Key Signature Schemes: Formal Definitions, Signing and Verification, Formal Proofs of Security of Full Domain Hashing. Formally Analyzing Cryptographic Protocols. Zero Knowledge Proofs and Protocols.	[3+12]
Total Hours:	**75**

Text Book(s):

1. Hans Delfs and Helmut Knebl, “Introduction to Cryptography: Principles and Applications”, Springer Verlag
2. Wenbo Mao, “Modern Cryptography, Theory and Practice”, Pearson Education (Low Priced Edition)

Reference(s):

1. ShaffiGoldwasser and MihirBellare, Lecture Notes on Cryptography, Available at http://citeseerx.ist.psu.edu/
2. OdedGoldreich, “Foundations of Cryptography”, CRC Press (Low Priced Edition Available), Part 1 and Part 23
3. William Stallings, “Cryptography and Network Security: Principles and Practice”, PHI 3rd Edition, 2006.

*SDG 4 - Quality Education

**SDG 9 - Industry, Innovation, and Infrastructure

***SDG 11 - Sustainable Cities and Communities

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. Of Hours
1	**Introduction**	
1.1	Basics of Symmetric Key and Asymmetric Key Cryptography, Hardness of Functions	1
1.2	Notions of Semantic Security (SS) and Message Indistinguishability (MI): Proof of Equivalence of SS and MI	1
1.3	Hard Core Predicate, Trap-Door Permutation, Goldwasser-Micali Encryption	1
2	**Formal Notions of Attacks**	
2.1	Attacks Under Message Indistinguishability: Chosen Plaintext Attack (IND-CPA)	1
2.2	Chosen Cipher text Attacks (IND-CCA1 and IND-CCA2), Attacks Under Message Non-Malleability: NM-CPA and NM-CCA2	1
2.3	Inter-Relations Among the Attack Model	1
3	**Random Oracles**	
3.1	Provable Security and Asymmetric Cryptography, Hash Functions	1
3.2	One-Way Functions: Weak and Strong One-Way Functions	1
3.3	Pseudo-Random Generators (PRG): Blum-Micali-Yao Construction, Construction of More Powerful PRG	1
4	**Building a Pseudorandom Permutation**	
4.1	The LubyRackoff Construction: Formal Definition	1
4.2	Application of the LubyRackoff Construction to the Construction of Block Ciphers	1
4.3	The Des in the Light of LubyRackoff Construction	1
5	**Message Authentication Codes**	
5.1	Left or Right Security (LOR), Using a PRF as a MAC, Variable Length MAC	1
5.2	Public Key Signature Schemes: Formal Definitions, Signing and Verification, Formal Proofs of Security of Full Domain Hashing	1
5.3	Formally Analyzing Cryptographic Protocols. Zero Knowledge Proofs and Protocols	1
6	**Project**	
6.1	Problem Identification	10
6.2	Solution For Problem	15
6.3	Implementation	20
6.4	Presentation	05
6.5	Report	05
6.6	Demo	05

Course Designer(s)

1. Thamizharasu.V – thamizharasu@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E44	Digital Marketing	Category	L	T	P	Credit
		PE	1	0	4	3

Objectives

- To primary objective of this module is to examine and explore the role and importance of digital marketing in today's rapidly changing business environment
- To focuses on how digital marketing can be utilized by organizations and how its effectiveness can be measured

Prerequisite

- Understanding of basic Marketing Principles and Strategies.

Course Outcomes

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

CO1	Outline the role and importance of digital marketing in today's rapidly changing business environment.	Understand
CO2	Focuses on how digital marketing can be utilized by organizations and how its effectiveness can be measured.	Apply
CO3	Identify the key elements of a digital marketing strategy.	Remember
CO4	Analyse the effectiveness of a digital marketing campaign can be measured.	Analyse
CO5	Apply advanced practical skills in common digital marketing tools such as SEO, SEM, Social media and Blogs.	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	-	-
CO2	2	2	-	-	3	-	-	-	-	-	-	-	3	-	-
CO3	2	2	-	2	2	-	-	-	-	-	-	-	3	-	-
CO4	2	2	2	3	2	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	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)
	1	2		
Remember	-	30	30	-
Understand	30	-	30	-
Apply	30	20	20	50
Analyse	-	10	20	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E44 - Digital Marketing

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	1	0	4	75	3	50	50	100

Introduction to Online Market* Online Market Space - Digital Marketing Strategy - Components - Opportunities for Building Brand Website - Planning and Creation - Content Marketing.	[3+12]
Search Engine Optimisation** Search Engine Optimisation - Keyword Strategy- SEO Strategy - SEO Success Factors - On-Page Techniques - Off-Page Techniques. Search Engine Marketing - How Search Engine Works - SEM Components - PPC Advertising - Display Advertisement.	[3+12]
E- Mail Marketing* E- Mail Marketing - Types of E-Mail Marketing - Email Automation - Lead Generation - Mobile Marketing- Mobile Inventory/Channels - Mobile Apps, Mobile Commerce, SMS Campaigns-Profiling and Targeting.	[3+12]
Social Media Marketing*** Social Media Marketing - Social Media Channels - Successful /Benchmark Social Media Campaigns. Engagement Marketing - Building Customer Relationships - Creating Loyalty Drivers - Influencer Marketing.	[3+12]
Digital Transformation*** Digital Transformation & Channel Attribution - Analytics - Ad-Words, Email, Mobile, Social Media, Web Analytics - Changing Your Strategy Based on Analysis - Recent Trends In Digital Marketing.	[3+12]
Total Hours:	**75**

Text Book(s):	
1.	"Fundamentals of Digital Marketing " by Puneet Singh Bhatia; Publisher: Pearson Education
2.	"Digital Marketing" by Vandana Ahuja; Publisher: Oxford University Press (April 2015).
Reference(s):	
1.	"Marketing 4.0: Moving from Traditional to Digital" by Philip Kotler; Publisher: Wiley; 1st edition (April 2017); ISBN10: 9788126566938;ISBN 13: 9788126566938;ASIN: 8126566930.
2.	Ryan, D, "Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation", Kogan Page Limited, 2014.
3.	Barker, Barker, Bormann and Neher(2017), Social Media Marketing: A Strategic Approach, 2E South-Western ,Cengage Learning
	Pulizzi,J "Beginner's Guide to Digital Marketing" , Mcgraw Hill Education

*SDG 4 - Quality Education

**SDG 9 - Industry, Innovation, and Infrastructure

***SDG 17 - Partnerships for the Goals

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. Of Hours**
1	**Introduction to Online Market**	
1.1	Online Market Space , Digital Marketing Strategy	1
1.2	Components , Opportunities for Building Brand Website	1
1.3	Planning and Creation , Content Marketing	1
2	**Search Engine Optimisation**	
2.1	Search Engine Optimisation , Keyword Strategy, SEO Strategy , SEO Success Factors	1
2.2	On-Page Techniques , Off-Page Techniques, Search Engine Marketing, How Search Engine Works	1
2.3	SEM Components, PPC Advertising , Display Advertisement	1
3	**E- Mail Marketing**	
3.1	E- Mail Marketing , Types of E- Mail Marketing , Email Automation , Lead Generation	1
3.2	Mobile Marketing, Mobile Inventory/Channels	1
3.3	Mobile Apps, Mobile Commerce, SMS Campaigns, Profiling and Targeting	1
4	**Social Media Marketing**	
4.1	Social Media Marketing , Social Media Channels	1
4.2	Successful /Benchmark Social Media Campaigns, Engagement Marketing	1
4.3	Building Customer Relationships, Creating Loyalty Drivers , Influencer Marketing	1
5	**Digital Transformation**	
5.1	Digital Transformation & Channel Attribution	1
5.2	Analytics, Ad-Words, Email, Mobile, Social Media, Web Analytics	1
5.3	Changing Your Strategy Based On Analysis, Recent Trends In Digital Marketing	1
6	**Project**	
6.1	Problem Identification	10
6.2	Solution For Problem	15
6.3	Implementation	20
6.4	Presentation	05
6.5	Report	05
6.6	Demo	05

Course Designer(s)

1.Thamizharasu.V – thamizharasu@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E45	Game Development	Category	L	T	P	Credit
		PE	1	0	4	3

Objectives

- To know the basics of 2D and 3D graphics for game development
- To know the stages of game develop
- To understand the basics of a game engine
- To survey the gaming development environment and toolkits
- To learn and develop simple games using Pygame environment

Pre – requisites

- Proficiency in Languages such as C# and Java.

Course Outcomes

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

CO1	Aquire knowledge on the concepts of 2D and 3D Graphics.	Understand
CO2	Design and develop the game design documents.	Apply
CO3	Apply various game engine algorithms.	Apply
CO4	Acquire knowledge on gaming environments and frameworks.	Understand
CO5	Develop a simple game in Pygame.	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	-	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	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)
	1	2		
Remember	-	-	-	-
Understand	30	20	40	-
Apply	30	40	60	100
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E45 – Game Development

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	1	0	4	75	3	50	50	100

3D Graphics for Game Design* Genres of Games, Basics of 2D and 3D Graphics for Game Avatar, Game Components – 2D and 3D Transformations – Projections – Color Models – Illumination and Shader Models – Animation– Controller Based Animation	[3+12]
Game Design Principles* Character Development, Storyboard Development for Gaming – Script Design – Script Narration, Game Balancing, Core Mechanics, Principles of Level Design – Proposals – Writing for Preproduction, Production and Post – Production.	[3+12]
Game Engine Design* Rendering Concept – Software Rendering – Hardware Rendering – Spatial Sorting Algorithms – Algorithms for Game Engine – Game Logic – Game AI – Pathfinding.	[3+12]
Overview of Gaming Platforms and Frameworks* Pygame Game development – Unity–Unity Scripts – Mobile Gaming, Game Studio, Unity Single player and Multi – Player games.	[3+12]
Game Development Using Pygame** Developing 2D and 3D interactive games using Pygame – Avatar Creation – 2D and 3D Graphics Programming – Incorporating music and sound – Asset Creations – Game Physics algorithms Development – Device Handling in Pygame – Overview of Isometric and Tile Based arcade Games – Puzzle Games.	[3+12]
Total Hours:	**75**

Text Book(s):

1.	SanjayMadhav,"GameProgrammingAlgorithmsandTechniques:APlatformAgnostic Approach", Addison Wesley,2013.
2.	PaulCraven ,"PythonArcadegames",ApressPublishers,2016.

Reference(s):

1.	Will McGugan, "Beginning Game Development with Python and Pygame: From Novice to Professional", Apress,2007.
2.	**D**avid H. Eberly ., "3D Game Engine Design: A Practical Approach to Real – Time Computer Graphics", Second Edition, CRC Press, 2006.

*SDG 4 – Quality Education

**SDG 9 – Industry Innovation and Infrastructure

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**3D Graphics for Game Design**	
1.1	Genres of Games, Basics of 2D and 3D Graphics for Game Avatar, Game Components, 2D and 3D Transformations	1
1.2	Projections, Colour Models , Illumination	1
1.3	Shader Models, Animation, Controller Based Animation	1
2	**Game Design Principles**	
2.1	Development, Storyboard Development for Gaming, Design – Script Narration	1
2.2	Game Balancing, Core Mechanics, Principles of Level Design	1
2.3	Proposals, Writing for Preproduction, Production and Post – Production.	1
3	**Game Engine Design**	
3.1	Rendering Concept , Software Rendering, Hardware Rendering	1
3.2	Spatial Sorting Algorithms, Algorithms for Game Engine	1
3.3	Game Logic , Game AI , Pathfinding	1
4	**Overview Of Gaming Platforms And Frameworks**	
4.1	Py game Game development, Unity – Unity Scripts	1
4.2	Mobile Gaming, Game Studio	1
4.3	Unity Single player and Multi – Player games.	1
5	**Game Development Using Pygame**	
5.1	Developing 2D and 3D interactive games using Pygame , Avatar Creation	1
5.2	2D and 3D Graphics Programming , Incorporating music and sound	1
5.3	Asset Creations , Game Physics algorithms Development , Device Handling in Pygame, Overview of Isometric and Tile Based arcadeGames , Puzzle Games	1
6	**Project**	
6.1	Problem Identification	10
6.2	Solution for Problem	15
6.3	Implementation	20
6.4	Presentation	05
6.5	Report	05
6.6	Demo	05

Course Designer(s)

1. R P Harshini – harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E46	Cognitive Science	Category	L	T	P	Credit
		PE	1	0	4	3

Objectives

- To know the theoretical background of cognition
- To understand the link between cognition and computational intelligence
- To explore probabilistic programming language
- To study the computational inference models of cognition
- To study the computational learning models of cognition

Pre-requisites

- Basic Knowledge on Neural Networks.

Course Outcomes

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

CO1	Acquire Knowledge on the underlying theory behind cognition.	Understand
CO2	Apply Computational Methods to sync with cognition elements.	Apply
CO3	Apply mathematical functions using Web PPL.	Apply
CO4	Develop applications using cognitive inference model.	Apply
CO5	Develop applications using cognitive learning model.	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	-	-	-	-	-	-	2	-
CO2	2	2	2	2	-	-	3	-	-	-	-	-	-	3	-
CO3	3	3	2	3	3	-	-	-	-	-	-	-	-	3	-
CO4	2	2	2	2	-	-	-	-	-	-	-	-	-	3	-
CO5	3	2	3	2	-	-	-	-	-	-	-	-	-	3	-
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

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

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E46 – Cognitive Science

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	1	0	4	75	3	50	50	100

Philosophy, Psychology and Neuro Science* Philosophy: Mental-physical Relation - From Materialism to Mental Science - Logic and the Sciences of the Mind - Psychology: Place of Psychology within Cognitive Science - Science of Information Processing - Cognitive Neuroscience – Perception.	[3+12]
Computational Intelligence* Machines and Cognition - Artificial Intelligence - Architectures of Cognition - Knowledge Based Systems - Logical Representation and Reasoning - Logical Decision Making.	[3+12]
Probabilistic Programming Language** WebPPL Language - Syntax - Using Javascript Libraries - Manipulating probability types and distributions - Finding Inference - Exploring random computation – Co routines: Functions that receive continuations.	[3+12]
Inference Models of Cognition* Generative Models – Conditioning Causal and statistical dependence-Conditional dependence - Data Analysis - Algorithms for Inference.	[3+12]
Learning Models of Cognition Learning as Conditional Inference - Learning with a Language of Thought –Hierarchical Models - Learning (Deep) Continuous Functions – Mixture Models.	[3+12]
Total Hours:	**75**

Text Book(s):

1.	Jose Luis Bermúde ,Cognitive Science – An Introduction to the Science of the Mind, Cambridge University Press 2020
2.	Vijay V Raghavan., Venkat N. Gudivada., Venu Govindaraju ., C.R. Rao, Cognitive Computing: Theory and Applications: (Handbook of Statistics 35), Elsevier publications, 2016
3.	Judith Hurwitz., Marcia Kaufman ,Adrian Bowles, Cognitive Computing and Big Data Analytics, Wiley Publications, 2015

Reference(s):

1.	Noah D. Goodman., Andreas Stuhlmuller., "The Design and Implementation of Probabilistic Programming Languages", Electronic version of book, https://dippl.org/.
2.	Noah D. Goodman., Joshua B. Tenenbaum , The Prob Mods Contributors ,"Probabilistic Models of Cognition", Second Edition, 2016, https://probmods.org/

*SDG 4 – Quality Education

**SDG 9 – Industry Innovation and Infrastructure

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Philosophy, Psychology And Neuroscience**	
1.1	Philosophy: Mental-physical Relation , From Materialism to Mental Science , Logic and the Sciences of the Mind	1
1.2	Psychology: Place of Psychology within Cognitive Science , Science of Information Processing	1
1.3	Cognitive Neuroscience , Perception , Decision	1
2	**Computational Intelligence**	
2.1	Machines and Cognition , Artificial Intelligence	1
2.2	Architectures of Cognition , Knowledge Based Systems	1
2.3	Logical Representation and Reasoning , Logical Decision Making	1
3	**Probabilistic Programming Language**	
3.1	WebPPL Language - Syntax , Using Java script Libraries	1
3.2	Manipulating probability types and distributions , Finding Inference	1
3.3	Exploring random computation – Co routines: Functions that receive continuations	1
4	**Inference Models Of Cognition**	
4.1	Generative Models ,Conditioning	1
4.2	Causal and statistical dependence	1
4.3	Conditional dependence , Data Analysis, Algorithms for Inference	1
5	**Learning Models Of Cognition**	
5.1	Learning as Conditional Inference	1
5.2	Learning with a Language of Thought	1
5.3	Hierarchical Models– Learning (Deep) Continuous Functions, Mixture models	1
6	**Project**	
6.1	Problem Identification	10
6.2	Solution for Problem	15
6.3	Implementation	20
6.4	Presentation	05
6.5	Report	05
6.6	Demo	05

Course Designer(s)

1. R P Harshini – harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E51	Image and Video Analytics	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the basics of image processing techniques for computer vision
- To learn the techniques used for image pre-processing
- To discuss the various object detection techniques
- To understand the various Object recognition mechanisms
- To elaborate on the video analytics techniques

Pre-requisites

- Proficiency in Python Libraries such as OpenCV and Tensorflow.

Course Outcomes

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

CO1	Acquire the basics of image processing techniques for computer vision and video analysis.	Understand
CO2	Identify the techniques used for image pre-processing.	Remember
CO3	Acquire knowledge on various object detection techniques.	Understand
CO4	Gain insights into the various face recognition mechanisms and implement it using Facenet.	Apply
CO5	Acquire Knowledge on deep learning-based video analytics.	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	-
CO2	2	2	3	3	-	-	-	-	-	-	-	-	-	2	-
CO3	2	2	2	2	-	-	-	-	-	-	-	-	-	3	-
CO4	2	2	3	2	3	-	-	-	-	-	-	-	-	3	-
CO5	3	2	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	30	-	30
Understand	30	30	40
Apply	-	30	30
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM E51 – Image and Video Analytics								
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* Computer Vision - Image Representation and Image Analysis Tasks - Image Representations – Digitization – Properties – Color Images – Data Structures for Image Analysis - Traditional and Hierarchical Image Data Structures.	[9]
Image Pre-Processing* Local Pre-Processing - Image Smoothing - Edge Detectors - Scale in Image Processing - Canny Edge Detection - Parametric Edge Models - Edges in Multi - Speralct Images - Local Pre-Processing in The Frequency Domain - Image Restoration.	[9]
Univariate Analysis* Object Detection – Object Detection Methods – Deep Learning Framework for Object Detection – Bounding Box Approach - Deep Learning Architectures - R-CNN - Faster R-CNN - You Only Look Once (Yolo) - Salient Features - Loss Functions - Yolo Architectures.	[9]
Face Recognition and Gesture Cognition** Face Recognition – Introduction - Applications of Face Recognition - Process of Face Recognition – Deep Face Solution by Facebook – Facenet for Face Recognition - Implementation Using Facenet - Gesture Recognition.	[9]
Video Analytics* Video Processing – Use Cases of Video Analytics - Vanishing Gradient and Exploding Gradient Problem - Restnet Architecture - Inception Network - Googlenet Architecture - Improvement in Inception V2 - Video Analytics – Restnet and Inception V3.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Milan Sonka., Vaclav Hlavac and Roger Boyle., “Image Processing, Analysis, and Machine Vision”, 4nd edition, Thomson Learning, 2013.
2.	Vaibhav Verdhan.,(2021,Computer Vision Using Deep Learning Neural Network Architectures with Python and Keras , Apress 2021.
Reference(s):	
1.	Milan Sonka., Vaclav Hlavac and Roger Boyle., “Image Processing, Analysis, and Machine Vision”, 4nd edition, Thomson Learning, 2013.
2.	Vaibhav Verdhan.,(2021,Computer Vision Using Deep Learning Neural Network Architectures with Python and Keras , Apress 2021.
3.	Milan Sonka., Vaclav Hlavac and Roger Boyle., “Image Processing, Analysis, and Machine Vision”, 4nd edition, Thomson Learning, 2013.
4.	Vaibhav Verdhan.,(2021,Computer Vision Using Deep Learning Neural Network Architectures with Python and Keras , Apress 2021.

*SDG 9 – Industry Innovation and Infrastructure

**SDG 3 – Good Health and Well Being

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Computer Vision	1
1.2	Image Representation and Image Analysis Tasks	1
1.3	Image Representations	1
1.4	Digitization	1
1.5	Properties	1
1.6	Color Images	1
1.7	Data Structures for Image Analysis	1
1.8	Traditional And Hierarchical Image Data Structures	2
2.0	**Image Pre-Processing**	
2.1	Local Pre-Processing	1
2.2	Image Smoothing	1
2.3	Edge Detectors	1
2.4	Zero-Crossings of The Second Derivative	1
2.5	Scale In Image Processing	1
2.6	Canny Edge Detection	1
2.7	Parametric Edge Models, Edges in Multi-Speralct Images	1
2.8	Local Pre-Processing in The Frequency Domain	1
2.9	Image Restoration	1
3.0	**Univariate Analysis**	
3.1	Object Detection, Object Detection Methods	1
3.2	Deep Learning Framework for Object Detection	1
3.3	Bounding Box Approach	1
3.4	Deep Learning Architectures-R-CNN	1
3.5	Deep Learning Architectures-Faster R-CNN	1
3.6	You Only Look Once (YOLO), Salient Features	1
3.7	Loss Functions	1
3.8	YOLO Architectures	2
4.0	**Face recognition and gesture recognition**	
4.1	Face Recognition, Introduction	1
4.2	Applications of Face Recognition	1
4.3	Process of Face Recognition	1
4.4	Deep Face Solution by Facebook	1
4.5	Face Net for Face Recognition	1
4.6	Implementation Using Face Net	2
4.7	Gesture Recognition	2
5.0	**Video Analytics**	
5.1	Video Processing	1
5.2	Use Cases of Video Analytics	1
5.3	Vanishing Gradient and Exploding Gradient Problem	1
5.4	RestNet Architecture	1
5.5	Inception Network	1
5.6	GoogleNet Architecture	1
5.7	Improvement In Inception V2-Video Analytics	1
5.8	Restnet	1
5.9	Inception V3	1

Course Designer(s)

1. R.P.Harshini – harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E52	DevOps	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To introduce DevOps terminology, definition & concepts
- To understand the different Version control tools like Git, Mercurial
- To understand the concepts of Continuous Integration/ Continuous Testing/ Continuous Deployment
- To understand Configuration management using Ansible
- Illustrate the benefits and drive the adoption of cloud-based Devops tools to solve real world problems

Pre-requisites

- Basic Knowledge of Linux Systems and Command-line Interface.

Course Outcomes

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

CO1	Acquire Knowledge on DevOps principles and concepts.	Understand
CO2	Perform Continuous Integration and Continuous Testing and Continuous Deployment Using Jenkins by Building And Automating Test Cases Using Maven & Gradle.	Apply
CO3	Ability to Perform Automated Continuous Deployment.	Apply
CO4	Ability to Do Configuration Management Using Ansible.	Apply
CO5	Acquire to Leverage Cloud Based DevOps Tools Using Azure DevOps.	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	-	-	3	-	-	-	-	-	3	-	2	-	-
CO2	3	3	-	-	3	-	-	-	-	-	2	-	3	-	-
CO3	3	3	2	-	3	-	-	-	-	-	2	-	3	-	-
CO4	3	3	2	-	3	-	-	-	-	-	3	-	3	-	-
CO5	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	-	-	-
Understand	40	20	50
Apply	20	30	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM E52 – DevOps								
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 DevOps* DevOps Essentials – DevOps concepts and Principles - DevOps Tools Overview – Introduction To AWS ,GCP, Azure - Importance of Version Control System and Software Development - Version Control Systems - Git and GitHub.	[9]
Compile and Build Using Maven & Gradle** Introduction- Installation of Maven, POM Files, Maven Build Lifecycle, Build Phases - Profiles, Maven Repositories - Maven Plugins, Maven Create and Build Artificats - Dependency Management - Installation of Gradle - Understand Build Using Gradle.	[9]
Continuous Integration Using Jenkins*** Install &Configure Jenkins - Jenkins Architecture Overview, Creating A Jenkins Job, Configuring A Jenkins Job - Introduction to Plugins, Adding Plugins to Jenkins, Commonly Used Plugins - Configuring Jenkins to Work With Java, Git and Maven.	[9]
Configuration Management Using Ansible* Ansible Introduction - Installation, Ansible Master/Slave Configuration - YAML Basics - Ansible Modules - Ansible Inventory Files- Ansible Playbooks- Ansible Roles - Adhoc Commands in Ansible.	[9]
Building DevOps Pipelines Using Azure* Create GitHub Account – Create Repository - Create Azure Organization – Create A New Pipeline - Build A Sample Code - Modify Azure – Pipelines Yaml File.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Roberto Vormittag., “A Practical Guide to Git and GitHub for Windows Users: From Beginner to Expert in Easy Step-By-Step Exercises”, Second Edition, Kindle Edition, 2016.
2.	Jason Cannon, “Linux for Beginners: An Introduction to the Linux Operating System and Command Line”, Kindle Edition, 2014.
Reference(s):	
1.	Jeff Geerling, “Ansible for DevOps: Server and configuration management for humans”, First Edition, 2015.
2.	David Johnson, “Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps”, Second Edition, 2016
3.	Mariot T sitoara, “Ansible Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer”, Second Edition, 2019.
4.	https://www.jenkins.io/user-handbook.pdf https://maven.apache.org/guides/getting-started.

*SDG 9 – Industry Innovation and Infrastructure
**SDG 3 – Good Health and Well Being
***SDG 7 – Affordable and Clean Energy

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Introduction**	
1.1	DevOps Essentials	1
1.2	DevOps concepts and Principles	1
1.3	Introduction to AWS	1
1.4	Introduction to GCP	1
1.5	Introduction to Azure	1
1.6	Importance of Version Control System and Software Development	1
1.7	Version Control Systems: Git	1
1.8	Version Control Systems: GitHub	2
2.0	**Compile And Build Using Maven & Gradle**	
2.1	Introduction, Installation of Maven	1
2.2	POM Files, Maven Build Lifecycle, Build Phases	2
2.3	Maven Profiles, Maven Repositories	1
2.4	Maven Plugins, Maven Create and Build Artifacts	2
2.5	Dependency Management	1
2.6	Installation of Gradle	1
2.7	Understand Build Using Gradle	1
3.0	**Continuous Integration Using Jenkins**	
3.1	Install & Configure Jenkins	1
3.2	Jenkins Architecture Overview	1
3.3	Creating A Jenkins Job, Configuring A Jenkins Job	1
3.4	Introduction to Plugins	1
3.5	Adding Plugins to Jenkins	1
3.6	Commonly Used Plugins	1
3.7	Configuring Jenkins to Work with Java	1
3.8	Git And Maven	2
4.0	**Configuration Management Using Ansible**	
4.1	Ansible Introduction	1
4.2	Ansible Installation	1
4.3	Ansible Master /Slave Configuration	1
4.4	YAML Basics	1
4.5	Ansible Modules	1
4.6	Ansible Inventory Files	1
4.7	Ansible Playbooks	1
4.8	Ansible Roles	1
4.9	Adhoc Commands In Ansible	1
5.0	**Building DevOps Pipelines Using Azure**	
5.1	Create GitHub Account	1
5.2	Create Repository	1
5.3	Create Azure Organization	2
5.4	Create a new pipeline	1
5.5	Build a sample code	2
5.6	Modify azure-Pipelines.Yaml file	2

Course Designer(s)

1. R.P.Harshini - harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E53	Engineering Secure Software Systems	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To know the importance and need for software security
- To know about various attacks
- To learn about secure software design
- To understand risk management in secure software development
- To know the working of tools related to software security

Pre-requisites

- Basic Knowledge on Software Development life cycles.

Course Outcomes

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

CO1	Identify various vulnerabilities related to memory attacks.	Remember
CO2	Gain Insights into the various security principles in software development.	Understand
CO3	Acquire knowledge on risk management system.	Understand
CO4	Involve selection of testing techniques related to software security in the testing phase of software development.	Apply
CO5	Apply tools for securing software.	Apply

Mapping with Programme Outcomes

COs	Os												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	-	-	-	-	-	2	-	-	-	-	2	-	-
CO2	2	2	-	-	-	-	-	3	-	-	-	-	3	-	-
CO3	1	2	-	-	-	-	-	3	-	-	-	-	3	-	-
CO4	2	3	-	-	3	-	-	3	-	-	-	-	2	-	-
CO5	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	30	-	40
Understand	30	40	40
Apply	-	20	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM E53 – Engineering Secure Software Systems

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

Need of Software Security and Low – Level Attacks* Software Assurance and Software Security - Threats to Software Security - Sources of Software Insecurity - Benefits of Detecting Software Security - Properties of Secure Software - Defense Against Memory-Based Attacks.	[9]
Secure Software Design** Requirements for Secure Software - SQUARE Process Model - Requirements Elicitation and Prioritization - Stack Inspection - Buffer Overflow – Code Injection - Session Hijacking. Secure Design - Threat Modeling and Security Design Principles.	[9]
Security Risk Management* Risk Management Lifecycle - Risk Profiling - Risk Exposure Factors - Risk Evaluation and Mitigation - Risk Assessment Techniques - Threat and Vulnerability Management.	[9]
Security Testing*** Traditional Software Testing - Comparison - Secure Software Development Life Cycle - Risk Based Security Testing - Penetration Testing -Enumeration - Remote Exploitation - Web Application Exploitation – Exploits and Client – Side Attacks- Post Exploitation.	[9]
Secure Project Management*** Governance and Security - Case Studies Highlighting Successful Governance Strategies- Security and Project Management - Risk Assessment Techniques and Their Role In Identifying Security Threats - Maturity of Practice - Key Indicators of Mature Security Practices.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Julia H. Allen, “Software Security Engineering”, Pearson Education, 2008.
2.	Evan Wheeler, “Security Risk Management: Building an Information Security Risk Management Program from the Ground Up”, First edition, Syngress Publishing, 2011.
Reference(s):	
1.	Mike Shema, “Hacking Web Apps: Detecting and Preventing Web Application Security Problems”, First edition, Syngress Publishing, 2012.
2.	Bryan Sullivan and Vincent Liu, “Web Application Security, A Beginner's Guide”, Kindle Edition, McGraw Hill, 2012.
3.	On Erickson, “Hacking: The Art of Exploitation”, 2nd Edition, No Starch Press, 2008.
4.	Robert C. Seacord, “Secure Coding in C and C++ (SEI Series in Software Engineering)”, Addison-Wesley Professional, 2005.

*SDG 9 – Industry Innovation and Infrastructure
**SDG 3 – Good Health and Well Being
***SDG 7 – Affordable and Clean Energy

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Need Of Software Security And Low-Level Attacks**	
1.1	Software Assurance and Software Security	2
1.2	Threats to software security	1
1.3	Sources of software insecurity	2
1.4	Benefits of Detecting Software Security	1
1.5	Properties of Secure Software	1
1.6	Defense Against Memory-Based Attacks	2
2.0	**Secure Software Design**	
2.1	Requirements Engineering for secure software	1
2.2	SQUARE process Model	1
2.3	Requirements elicitation and prioritization	1
2.4	Stack Inspection	1
2.5	Buffer Overflow	1
2.6	Code Injection	1
2.7	Session Hijacking	1
2.8	Secure Design - Threat Modeling and Security Design Principles	2
3.0	**Security Risk Management**	
3.1	Risk Management LifeCycle	2
3.2	Risk Profiling	1
3.3	Risk Exposure Factors	2
3.4	Risk Evaluation and mitigation	1
3.5	Risk Assessment Techniques	1
3.6	Threat and Vulnerability Management	2
4.0	**Security Testing**	
4.1	Traditional Software Testing, Comparison	1
4.2	Secure Software Development Life Cycle	1
4.3	Risk Based Security Testing	1
4.4	Penetration Testing	1
4.5	Enumeration	1
4.6	Remote Exploitation	1
4.7	Web Application Exploitation	1
4.8	Exploits and Client- side attacks	1
4.9	Post Exploitation	1
5.0	**Secure Project Management**	
5.1	Governance and Security	1
5.2	Case Studies Highlighting Successful Governance Strategies	1
5.3	Security and Project Management	2
5.4	Risk Assessment Techniques and their role in Identifying Security Threats	1
5.5	Maturity of Practice	2
5.6	Key Indicators of Mature Security Practices	2

Course Designer(s)

1. R.P.Harshini - harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

60 AM E54	Visual Effects	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To get a basic idea on animation principles and techniques
- To get exposure to CGI, colour and light elements of VFX
- To have a better understanding of basic special effects techniques
- To have a knowledge of state of the artvfx techniques
- To become familiar with popular compositing techniques

Pre-requisites

- Basic Knowledge of Design Principles and Visual Storytelling.

Course Outcomes

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

CO1	Acquire knowledge on the animation basics.	Understand
CO2	Apply CGI, color and light elements in VFX applications.	Apply
CO3	Apply special effects using state-of-the-art tools.	Apply
CO4	Apply popular visual effects techniques using advanced tools.	Apply
CO5	Apply Compositing tools for creating VFX for a variety of applications.	Apply

Mapping with Programme Outcomes

COs	Os												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	3	-	2	-	-	-	-	-	-	-	2	-	-
CO3	2	3	3	-	2	-	-	-	-	-	-	-	2	2	-
CO4	3	3	2	-	3	-	-	-	-	-	-	-	2	-	-
CO5	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
Understand	30	20	40
Apply	30	20	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – Artificial Intelligence and Machine Learning								
60 AM E54 – Visual Effects								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Animation Basics* VFX Production Pipeline, Principles of Animation, Techniques: Keyframe, Kinematics, Full Animation, Limited Animation, Rotoscoping, Stop Motion, Object Animation, Pixilation, Rigging, Shape Keys, Motion Paths.	[9]
CGI Color, Light** CGI – Virtual Worlds, Photorealism, Physical Realism, Function Realism, 3D Modeling and Rendering: Color -Color Spaces, Color Depth, Color Grading, Color Effects, HDRI, Light – Area and Mesh Lights, PBR Lights, Photometric Light, BRDF Shading Model.	[9]
Special Effects*** Special Effects – Props, Scaled Models, Animatronics, Pyro techniques, Schüfftan Process, Particle Effects – Wind, Rain, Fog, Fire.	[9]
Visual Effects Techniques*** Motion Capture, Matt Painting, Rigging, Front Projection. Rotoscoping, Match Moving – Tracking, Camera Reconstruction, Planar Tracking, Calibration, Point Cloud Projection, Ground Plane Determination, 3D Match Moving.	[9]
Compositing*** Compositing – Chroma Key, Blue Screen/Green Screen, Background Projection, Alpha Compositing, Deep Image Compositing, Multiple Exposure, Matting, VFX Tools -Blender, Natron, GIMP.	[9]
Total Hours:	**45**

Text Book(s):	
1.	ChrisRoda, Real Time Visual Effects for the Technical Artist, CRC Press, 1st Edition, 2022.
2.	Steve Wright, Digital Compositing for film and video, Routledge, 4th Edition, 2017.
Reference(s):	
1.	Luiz Velho, Bruno Madeira, “Introduction to Visual Effects A Computational Approach”, Routledge, 2023.
2.	Jasmine Katatikarn., Michael Tanzillo ., “Lighting for Animation: The art of visual storytelling, Routledge, 1st Edition, 2016.
3.	Jon Gress, “Digital Visual Effects and Compositing”, New Riders Press, 1st Edition, 2014.
4.	https://www.blender.org/features/vfx/ https://natrongithub.github.io/

*SDG 4 – Quality Education
**SDG 12 – Responsible Consumption Production
***SDG 9 – Industry Innovation and Infrastructure

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Animation Basics**	
1.1	VFX Production Pipeline	1
1.2	Principles Of Animation	1
1.3	Techniques: Keyframe, Kinematics	1
1.4	Techniques: Full Animation, LimitedAnimation	1
1.5	Techniques: Rotoscoping, StopMotion	1
1.6	Object Animation, Pixilation	1
1.7	Rigging, Shape Keys	1
1.8	Motion Paths	2
2.0	**CGI,Color,Light**	
2.1	CGI – Virtual Worlds, Photorealism, Physical Realism	2
2.2	3D Modeling and Rendering	1
2.3	Color -Color Spaces, Color Depth	1
2.4	Color – Color Grading, Color Effects, HDRI	1
2.5	Light - Area and Mesh Lights	1
2.6	Light - PBR Lights	1
2.7	Light - Photometric Light	1
2.8	BRDF Shading Model	1
3.0	**Special Effects**	
3.1	Special Effects – Props	2
3.2	Scaled Models	1
3.3	Animatronics	1
3.4	Pyro Techniques	2
3.5	Schüfftan Process	1
3.6	Particle Effects – Wind, Rain, Fog, Fire	2
4.0	**Visual Effects Techniques**	
4.1	Motion Capture, Matt Painting	1
4.2	Rigging, Front Projection	1
4.3	Rotoscoping	1
4.4	Match Moving – Tracking, Camera Reconstruction	1
4.5	Planar Thinking	1
4.6	Calibration	1
4.7	Point Cloud Projection	1
4.8	Ground Plane Determination	1
4.9	3d Match Moving	1
5.0	**Compositing**	
5.1	Compositing – Chroma Key, Blue Screen/Green Screen	1
5.2	Background Projection	1
5.3	Alpha Compositing	1
5.4	Deep Image Compositing	1
5.5	Multiple Exposure	1
5.6	Matting	1
5.7	VFX Tools -Blender	1
5.8	VFX Tools - Natron	1
5.9	VFX Tools - GIMP	1

Course Designer(s)

1. R.P.Harshini – harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E55	3D Printing and Design	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To discuss on basics of 3D printing
- To explain the principles of 3D printing technique
- To explain and illustrate inkjet technology
- To explain and illustrate laser technology
- To discuss the applications of 3D printing

Pre-requisites

- Basic Knowledge on 3D Printing Technologies.

Course Outcomes

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

CO1	Outline and examine the basic concepts of 3D printing technology.	Remember
CO2	Outline 3D printing workflow.	Understand
CO3	Acquire knowledge on the concepts and working principles of 3D printing using inkjet technique.	Understand
CO4	Acquire knowledge on the working principles of 3D printing using laser technique.	Understand
CO5	Analyse the applications of 3D Printing technology in various fields	Analyse

Mapping with Programme Outcomes

COs	Os												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	-	-	-	-	2	-	-	-	-	-	-		-
CO2	3	2	-	-	-	-	2	-	-	-	-	-	2		-
CO3	2	2	3	-	-	-	3	-	-	-	-	-	2	-	-
CO4	2	2	3	-	-	-	3	-	-	-	-	-	2	-	-
CO5	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	30	-	30
Understand	30	60	50
Apply	-	-	-
Analyse	-	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE(Artificial Intelligence and Machine Learning)								
60 AM E55 – 3D Printing 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* Introduction; Design Considerations – Material, Size, Resolution, Process; Modeling and Viewing - 3D; Scanning; Model Preparation – Digital; Slicing; Software; File Formats.	[9]
Principle* Processes - Extrusion, Wire, Granular, Lamination, Photo Polymerisation; Materials - Paper, Plastics, Metals, Ceramics, Glass, Wood, Fiber, Sand, Biological Tissues, Hydrogels, Graphene; Material Selection - Processes, Applications, Limitations	[9]
Inkjet Technology** Printer - Working Principle, Positioning System, Print Head, Print Bed, Frames, Motion Control; Print Head Considerations – Continuous Inkjet, Thermal Inkjet, Piezoelectric Drop-On-Demand - Liquid Based Fabrication - Powder Based Fabrication.	[9]
Laser Technology** Light Sources – Types, Characteristics; Optics – Deflection, Modulation; Material Feeding and flow – Liquid, powder; Printing machines – Types, Working Principle, Build Platform, Print bed Movement, Support structures – Applications.	[9]
Industrial Applications*** Introduction to Industrial Applications - Product Models, Manufacturing – Printed Electronics, Biopolymers, Packaging, Healthcare, Food, Medical, Biotechnology, Displays- Evolution of display technologies - Applications -Future Trends.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Christopher Barnatt, 3D Printing: The Next Industrial Revolution, CreateSpace Independent Publishing Platform, 2013.
2.	Ian M. Hutchings, Graham D. Martin, Inkjet Technology for Digital Fabrication, John Wiley& Sons, 2013.
Reference(s):	
1.	Chua, C.K., Leong K.F. and Lim C.S., Rapid prototyping: Principles and applications, second edition, World Scientific Publishers, 2010.
2.	Ibrahim Zeid, Mastering CAD CAM Tata McGraw-Hill Publishing Co., 2007.
3.	Joan Horvath, Mastering 3D Printing, APress, 2014.

*SDG 9 – Industry Innovation and Infrastructure
**SDG 12 – Responsible Consumption and Production
**SDG 3 – Good Health and Well Being

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Introduction	1
1.2	Design Considerations – Material, Size	1
1.3	Design Considerations - Resolution, Process	1
1.4	Modelling And Viewing - 3D	1
1.5	Scanning	1
1.6	Model Preparation – Digital; Slicing	1
1.7	Software	1
1.8	File Formats	2
2.0	**Principle**	
2.1	Processes – Extrusion, Wire, Granular	1
2.2	Processes –Lamination, Photo Polymerisation	1
2.3	Materials - Paper, Plastics, Metals	1
2.4	Materials - Ceramics, Glass, Wood, Fiber, Sand	2
2.5	Materials - Biological Tissues, Hydrogels, Graphene	1
2.6	Material Selection – Processes	1
2.7	Material Selection -Applications, Limitations	2
3.0	**Inkjet Technology**	
3.1	Printer - Working Principle, Positioning System, Print Head	2
3.2	Printer - Print Bed, Frames, Motion Control	1
3.3	Print Head Considerations -Continuous Inkjet, Thermal Inkjet	2
3.4	Print Head Considerations - Piezoelectric Drop-On-Demand	2
3.5	Liquid Based Fabrication	1
3.6	Powder Based Fabrication	1
4.0	**Laser Technology**	
4.1	Light Sources - Types, Characteristics	1
4.2	Optics -Deflection	1
4.3	Optics – Modulation	1
4.4	Material Feeding and Flow - Liquid, Powder	1
4.5	Printing Machines -Types, Working Principle	1
4.6	Printing Machines -Build Platform, Print Bed Movement	1
4.7	Printing Machines -Support Structures	2
4.8	Applications	1
5.0	**Industrial Applications**	
5.1	Introduction to Industrial Applications	1
5.2	Product Models	1
5.3	Manufacturing – Printed Electronics, Biopolymers	2
5.4	Manufacturing - Packaging, Healthcare	1
5.5	Manufacturing - Food, Medical, Biotechnology	1
5.6	Evolution of display technologies	1
5.7	Applications	1
5.8	Future Trends	1

Course Designer(s)

1. R.P.Harshini – harshinirp@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM E56	Ethics & AI	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To study the morality and ethics in AI
- To learn about the Ethical initiatives in the field of artificial intelligence
- To study about AI standards and Regulations
- To study about social and ethical issues of Robot Ethics
- To study about AI and Ethics- challenges and opportunities

Pre-requisites

- Understanding of ethical theories and AI Concepts.

Course Outcomes

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

CO1	Acquire knowledge about morality and ethics in AI.	Understand
CO2	Acquire knowledge on ethical initiatives in AI and analyse it in vaious fields.	Analyse
CO3	Acquire knowledge about AI standards and Regulations like AI Agent, Safe Design of Autonomous and Semi-Autonomous Systems.	Understand
CO4	Gain insights into robots and roboethics.	Understand
CO5	Analyse the real time application ethics, issues and its challenges	Analyse

Mapping with Programme Outcomes

COs	Os												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	-	-	-	2	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	2	-	-	-	-	2	2	-
CO3	2	3	-	-	-	-	-	3	-	-	-	-	2	-	-
CO4	3	2	-	-	-	2	-	3	-	-	-	-	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	-	30	-
Understand	30	30	50
Apply	10	-	-
Analyse	20	-	50
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM E56 – Ethics & AI								
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* Definition Of Morality and Ethics in AI-Impact on Society-Impact on Human Psychology-Impact on The Legal System-Impact on The Environment And The Planet-Impact On Trust.	[9]
Ethical Initiatives in Ai** Introduction to Ethical Initiatives in AI - International Ethical Initiatives-Ethical Harms and Concerns-Case Study: Healthcare Robots, Autonomous Vehicles, Warfare and Weaponization - Emerging Challenges.	[9]
AI Standards and Regulation* Model Process for Addressing Ethical Concerns During System Design - Transparency of Autonomous Systems - Data Privacy Process- Algorithmic Bias Considerations - Ontological Standard for Ethically Driven Robotics and Automation System.	[9]
Roboethics: Social and Ethical Implication of Robotics*** Robot - Roboethics - Ethics and Morality- Moral Theories- Ethics in Science and Technology - Ethical Issues in an ICT Society- Harmonization of Principles- Ethics and Professional Responsibility- Roboethics Taxonomy.	[9]
AI and Ethics – Challenges and Opportunities** Introduction to AI and Ethics – Challenges-Opportunities- Ethical Issues in Artificial Intelligence- Societal Issues Concerning the Application of Artificial Intelligence In Medicine- Decision-Making Role In Industries-National & International Strategies on AI.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Y. Eleanor Bird.,Jasmin Fox- Skelly., Nicola Jenner., Ruth Larbey., Emma Weitkamp and Alan Winfield, "The ethics of artificial intelligence: Issues and initiatives", March 2020.
2.	Patrick Lin, Keith Abney, George A Bekey," Robot Ethics: The Ethical and Social Implications of Robotics", The MIT Press- January 2014.
Reference(s):	
1.	Towards a Code of Ethics for Artificial Intelligence (Artificial Intelligence: Foundations, Theory, and Algorithms) by Paula Boddington, November 2017.
2.	Mark Coeckelbergh," AI Ethics", The MIT Press Essential Knowledge series, April 2020.
3.	https://www.weforum.org/agenda/2016/10/top-10-ethical-issues-in-artificial-intelligence.
4.	https://sci-hub.mksa.top/10.1159/000492428

*SDG 16 – Peace, Justice, and Strong Institutions

**SDG 9 – Industry Innovation and Infrastructure

***SDG 4 – Quality Education

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Definition Of Morality and Ethics In AI	1
1.2	Impact on Society	1
1.3	Impact on Human Psychology	2
1.4	Impact on the Legal System	2
1.5	Impact on the Environment and The Planet	2
1.6	Impact on Trust	1
2.0	**Ethical Initiatives in AI**	
2.1	Introduction to Ethical Initiatives in AI	1
2.2	International Ethical Initiatives	1
2.3	Ethical Harms and Concerns	1
2.4	Case Study: Healthcare Robots	1
2.5	Case Study: Autonomous Vehicles	1
2.6	Case Study: Warfare and Weaponization	2
2.7	Emerging Challenges	1
3.0	**AI Standards and Regulation**	
3.1	Model Process for Addressing Ethical Concerns During System Design	2
3.2	Transparency Of Autonomous Systems	2
3.3	Data Privacy Process	1
3.4	Algorithmic Bias Considerations	2
3.5	Ontological Standard for Ethically Driven Robotics and Automation Systems.	2
4.0	**Robot Ethics : Social and Ethical Implication of Robotics**	
4.1	Robot – Roboethics	1
4.2	Ethics and Morality, Moral Theories	1
4.3	Ethics in Science and Technology	1
4.4	Ethical Issues in an ICT Society	1
4.5	Harmonization of Principles	2
4.6	Ethics and Professional Responsibility	1
4.7	Robot Ethics Taxonomy	2
5.0	**AI and Ethics – Challenges and Opportunities**	
5.1	Introduction to AI and Ethics	1
5.2	Challenges, Opportunities	1
5.3	Ethical Issues in Artificial Intelligence	2
5.4	Societal Issues Concerning the Application of Artificial Intelligence in Medicine	2
5.5	Decision-Making Role in Industries	1
5.6	National And International Strategies On AI	2

Course Designer(s)

1. R.P.Harshini – harshhinirp@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM L01	Exploratory Data Analysis	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To outline an overview of exploratory data analysis
- To implement data visualization using Matplotlib
- To perform univariate data exploration and analysis
- To apply bivariate data exploration and analysis
- To use Data exploration and visualization techniques for multivariate and time series data

Pre-requisites

- Basic Understanding of Statistics and Probability.

Course Outcomes

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

CO1	Acquire knowledge on the fundamentals of exploratory data analysis.	Understand
CO2	Apply the data visualization using Matplotlib.	Apply
CO3	Apply univariate data exploration and analysis.	Apply
CO4	Apply bivariate data exploration and analysis.	Apply
CO5	Apply Data exploration and visualization techniques for multivariate and time series data.	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	-	-	-	-	-	-	-	-	2	-
CO2	2	2	2	3	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	2	3	-	-	-	-	-	-	-	-	3	-
CO4	2	2	2	2	3	-	-	-	-	-	-	-	-	2	-
CO5	2	2	3	2	1	-	-	-	-	-	-	-	-	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

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

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM L01 – Exploratory Data Analysis								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Exploratory Data Analysis** EDA fundamentals – Understanding data science – Significance of EDA – Making sense of data – Comparing EDA with classical and Bayesian analysis – Software tools for EDA - Visual Aids for EDA- Data transformation techniques-merging database, reshaping and pivoting, Transformation techniques.	[9]
Exploratory Data Analysis using Python* Data Manipulation using Pandas – Pandas Objects – Data Indexing and Selection – Operating on Data – Handling Missing Data – Hierarchical Indexing – Combining datasets – Concat, Append, Merge and Join – Aggregation and grouping.	[9]
Univariate Analysis* Introduction to Single variable: Distribution Variables - Numerical Summaries of Level and Spread - Scaling and Standardizing – Inequality.	[9]
Bivariate Analysis* Relationships between Two Variables - Percentage Tables - Analysing Contingency Tables - Handling Several Batches – Scatterplots - Resistant Lines.	[9]
Multivariate and Time Series Analysis** Introducing a Third Variable - Causal Explanations - Three-Variable Contingency Tables and Beyond – Fundamentals of TSA – Characteristics of time series data – Data Cleaning – Time-based indexing – Visualizing – Grouping – Resampling.	[9]
Total Hours:	45

Text Book(s):	
1.	Suresh Kumar Mukhiya, Usman Ahmed, “Hands-On Exploratory Data Analysis with Python”, Packt Publishing, 2020.
2.	Jake Vander Plas, "Python Data Science Handbook: Essential Tools for Working with Data", First Edition, O Reilly, 2017.
Reference(s):	
1.	Eric Pimpler, “Data Visualization and Exploration with R”, GeoSpatial Training service, 2017.
2.	Claus O. Wilke, “Fundamentals of Data Visualization”, O’reilly publications, 2019.
3.	Matthew O. Ward, Georges Grinstein, Daniel Keim, “Interactive Data Visualization: Foundations, Techniques, and Applications”, 2nd Edition, CRC press, 2015.
4.	Catherine Marsh, Jane Elliott, “Exploring Data: An Introduction to Data Analysis for Social Scientists”, Wiley Publications, 2nd Edition, 2008.

*SDG 9 – Industry Innovation and Infrastructure

**SDG 4 – Quality Education

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Exploratory Data Analysis**	
1.1	EDA fundamentals, Understanding data science , Significance of EDA	1
1.2	Making sense of data	1
1.3	Comparing EDA with classical and Bayesian analysis	1
1.4	Software tools for EDA	1
1.5	Visual Aids for EDA	1
1.6	Data transformation techniques-merging database	1
1.7	Reshaping and Pivoting	2
1.8	Transformation techniques.	1
2	**Exploratory Data Analysis using Python**	
2.1	Data Manipulation using Pandas	1
2.2	Pandas Objects	1
2.3	Data Indexing and Selection	1
2.4	Operating on Data	1
2.5	Handling Missing Data	1
2.6	Hierarchical Indexing	1
2.7	Combining datasets – Concat , Append,	1
2.8	Merge and Join	1
2.9	Aggregation and grouping	1
3	**Univariate Analysis**	
3.1	Introduction to Single Variable	1
3.2	Distribution Variables	2
3.3	Numerical Summaries of Level And Spread	2
3.4	Scaling and Standardizing	2
3.5	Inequality	2
4	**Bivariate Analysis**	
4.1	Relationships between Two Variables	1
4.2	Percentage Tables	1
4.3	Analysing Contingency Tables	2
4.4	Handling Several Batches	2
4.5	Scatterplots	2
4.6	Resistant Lines	1
5	**Multivariate and Time Series Analysis**	
5.1	Introducing a Third Variable	1
5.2	Causal Explanations	1
5.3	Three-Variable Contingency Tables and Beyond	1
5.4	Fundamentals of TSA	1
5.5	Characteristics of time series data, Data Cleaning	1
5.6	Time-based indexing	1
5.7	Visualizing	1
5.8	Grouping	1
5.9	Resampling.	1

Course Designer(s)

1. Mr.K.Praveen – praveen@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM L02	AI for Energy Conservation and Management	Category	L	T	P	Credit
		OE	1	0	4	3

Objectives

- To provide a knowledge of artificial intelligence (AI) applications in climate change
- To explore the role of AI in monitoring greenhouse gas emissions for sustainable innovations
- To equip students with knowledge of energy systems for AI-driven sustainability initiatives
- To identify the risks, barriers, and ethical considerations associated with implementing AI for emissions reduction
- To analyse the use of AI in key sectors, including manufacturing, food systems, and transportation

Pre–requisites

- NIL.

Course Outcomes

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

CO1	Demonstrate an AI technologies in climate change mitigation efforts.	Understand
CO2	Apply AI's in monitoring, decision-making in various sectors to reduce emissions.	Apply
CO3	Analyze and suggest policies and frameworks of power and energy sector that support.	Analyse
CO4	Identify barriers and ethical concerns in AI in manufacturing and materials innovation.	Analyse
CO5	Design AI-driven strategies and solutions in manufacturing, and food systems.	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	-	-
CO2	3	3	-	-	3	-	2	-	-	-	-	-	-	3	-
CO3	3	3	-	-	-	-	3	-	-	-	-	-	2	-	-
CO4	3	3	-	-	-	3	3	-	-	-	-	-	-	2	-
CO5	3	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)
	1	2		
Remember	30	-	-	-
Understand	-	-	-	-
Apply	30	40	80	80
Analyse	-	20	20	20
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E – CSE (Artificial Intelligence and Machine Learning)								
60 AM L02 - AI for Energy Conservation and Management								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	1	0	4	75	3	50	50	100

Artificial Intelligence and Climate Change* AI: Key definitions, types, and capabilities. Climate change: Causes, impacts, and current challenges. AI with climate science and mitigation efforts. AI advancements and sustainability. Examples of AI applications: climate monitoring and prediction	[3+12]
Greenhouse Gas Emissions Monitoring Traditional vs. AI-enabled greenhouse gas (GHG) monitoring. AI in methane detection and carbon dioxide sequestration analysis. Basics of remote sensing: satellites, drones, and sensors for GHG data collection. AI applications in satellite imagery processing. Challenges in data availability, sovereignty, and validation. AI in global GHG inventory management. International laws and agreements guiding AI-driven monitoring systems.	[3+12]
AI in the Power and Energy Sector AI applications: renewable energy generation and optimization. Managing smart grids and energy storage systems with AI. Demand-response programs and vehicle-to-grid integration. Risk management in AI-powered energy systems. Case studies: AI-enabled de-carbonization in power infrastructure.	[3+12]
AI in Manufacturing and Materials Innovation AI in optimizing manufacturing processes and reducing emissions. AI-driven materials discovery for sustainable technologies. Case studies: AI applications in steelmaking and material recycling. Barriers to AI adoption in industrial de-carbonization. Future trends in AI-enabled innovations for manufacturing.	[3+12]
AI in Food Systems and Transportation Reducing food system emissions through AI-based precision agriculture. AI's role in alternative protein production and waste reduction. Intelligent transportation systems for reducing road transport emissions. Challenges in deploying AI for food and transportation sectors. Success stories: Sustainable AI implementations in food and transport.	[3+12]
Total Hours:	**75**

Text Book(s):	
1.	Martin Ford, “Artificial Intelligence and Climate Change”, 2023, 1st Edition.

Reference(s):	
1.	F. Kreith and D. Yogi Goswami, “Energy and AI: Applications, Challenges, and Opportunities” CRC Press, 2021, 1st Edition.
2.	Vassilis Pachidis and Nick Jenkins, “Machine Learning for Sustainable Energy and Transportation Systems”,Springer Publication, 2020, 1st Edition.
3.	R. Kumar and S. Das, “AI for Earth and Energy: Applications and Challenges”, Wiley, 2022, 1st Edition.

*SDG 13: Climate Action
**SDG 7: Affordable and Clean Energy
***SDG 9: Industry, Innovation, and Infrastructure
****SDG 11: Sustainable Cities and Communities

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Artificial Intelligence and Climate Change**	
1.1	AI: Key definitions, types, and capabilities. Climate change: Causes, impacts, and current challenges	1
1.2	AI with climate science and mitigation efforts. AI advancements and sustainability	1
1.3	Examples of AI applications: climate monitoring and prediction	1
2	**Greenhouse Gas Emissions Monitoring**	
2.1	Traditional vs. AI-enabled greenhouse gas (GHG) monitoring. AI in methane detection and carbon dioxide sequestration analysis	1
2.2	Basics of remote sensing: satellites, drones, and sensors for GHG data collection. AI applications in satellite imagery processing. Challenges in data availability, sovereignty, and validation.	1
2.3	AI in global GHG inventory management. International laws and agreements guiding AI-driven monitoring systems.	1
3	**AI in the Power and Energy Sector**	
3.1	AI applications: renewable energy generation and optimization. Managing smart grids and energy storage systems with AI	1
3.2	Demand-response programs and vehicle-to-grid integration	1
3.3	Risk management in AI-powered energy systems. Case studies: AI-enabled de-carbonization in power infrastructure	1
4	**AI in Manufacturing and Materials Innovation**	
4.1	AI in optimizing manufacturing processes and reducing emissions. AI-driven materials discovery for sustainable technologies	1
4.2	Case studies: AI applications in steelmaking and material recycling. Barriers to AI adoption in industrial de-carbonization	1
4.3	Future trends in AI-enabled innovations for manufacturing	1
5	**AI in Food Systems and Transportation**	
5.1	Reducing food system emissions through AI-based precision agriculture. AI's role in alternative protein production and waste reduction	1
5.2	Intelligent transportation systems for reducing road transport emissions	1
5.3	Challenges in deploying AI for food and transportation sectors. Success stories: Sustainable AI implementations in food and transport.	1
6	**Project**	
6.1	Problem Identification	05
6.2	Solution for Problem	05
6.3	Implementation	20
6.4	Presentation	20
6.5	Report	05
6.6	Demo	05

Course Designer(s)

1. Mrs.S.Meenachi – meenachi@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

Approved in Academic Council Meeting held on 25/05/2024 BoS Chairman Signature

60 AM L03	Intelligent AR/VR Systems	Category	L	T	P	Credit
		OE	1	0	4	3

Objectives

- To impart the fundamental aspects and principles of AR/VR technologies
- To know the internals of the hardware and software components involved in the development of AR/VR enabled applications
- To learn about the graphical processing units and their architectures
- To gain knowledge about AR/VR application development
- To know the technologies involved in the development of AR/VR based applications

Pre–requisites

- Basic Understanding of spatial Mathematics concepts.

Course Outcomes

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

CO1	Acquire foundational knowledge of AR and VR concepts.	Apply
CO2	Identify the tools and technologies pertaining to AR/VR.	Apply
CO3	Insights into the working principle of AR/VR related Sensor devices.	Apply
CO4	Develop the various models using modeling techniques.	Apply
CO5	Develop AR/VR applications in different domains.	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	-	-	-	3	-	-	-	-	-	-	-	-	2	-
CO2	3	-	-	-	3	-	-	-	-	-	-	-	-	2	-
CO3	3	-	-	-	3	-	-	-	3	-	-	-	-	2	-
CO4	3	-	-	-	3	-	-	-	3	-	-	-	-	3	-
CO5	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)
	1	2		
Remember	30	-	-	-
Understand	-	-	-	-
Apply	30	60	50	50
Analyse	-	-	10	10
Evaluate	-	-	-	-
Create	-	-	40	40
Total	60	60	100	100

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – CSE (Artificial Intelligence and Machine Learning)

60 AM L03 – Intelligent AR/VR Systems

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	1	0	4	75	3	50	50	100

Introduction Introduction to Virtual Reality – Introduction to Trajectories and Hybrid Space – Three I's of Virtual Reality – Components of VR System – Introduction to AR Technologies – Input Devices – 3D Position Trackers, Types of Trackers – Gesture Interfaces – Types of Gesture Input Devices – Output Devices – Graphics Display, Human Visual System and Personal Graphics Displays.	[3+12]
Augmented Reality Introduction to Augmented Reality – Computer Vision for AR – Interaction in AR – Modelling and Annotation in AR – Navigation in AR – Wearable Devices for AR.	[3+12]
AR components and Techniques AR Frameworks, Practical understanding of real world AR application development, AR methodologies and project types.	[3+12]
VR components and techniques VR frameworks, Practical Understanding of real world VR application development, VR methodologies and project types, Navigation and Manipulation Interface techniques in Blender.	[3+12]
Application Using Unity AR advanced SDKs, AR core & Kit, AR spark studio, Vuforia engine, perform preliminary data quality and formatting, Hands on Unity Software and Use case applications, Purpose of Wikitude and 8th wall tools.	[3+12]
Total Hours:	**75**

Text Book(s):

1. David Rose,"Super sight: What Augmented Reality Means for our lives, our work, and the way we imagine our future", Nov 2021.
2. Jonathan Linowes, "Augmented Reality with Unity AR Foundation- a practical guide to cross platform AR development with Unity and later versions, 2021.
3. Kenneth J.Varnum, Beyond Reality- Augmented Virtual and Mixed Reality in the library, 2020.

Reference(s):

1. Hevin W Allen, Meta Verse- A beginner's guide to the new digital revolution.
2. Lily Sayter, Brain Solis, The augmented Workforce, 2020.

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Introduction**	
1.1	Introduction to Virtual Reality , Introduction to Trajectories and Hybrid Space , Three I's of Virtual Reality , Components of VR System	1
1.2	Introduction to AR Technologies , Input Devices , 3D Position Trackers, Types of Trackers , Gesture Interfaces	1
1.3	Types of Gesture Input Devices , Output Devices , Graphics Display, Human Visual System and Personal Graphics Displays.	1
2	**Augmented Reality**	
2.1	Introduction to Augmented Reality , Computer Vision for AR	1
2.2	Interaction in AR , Modelling and Annotation in AR	1
2.3	Navigation in AR , Wearable Devices for AR	1
3	**AR components and Techniques**	
3.1	AR Frameworks	1
3.2	Practical understanding of real world AR application development	1
3.3	AR methodologies and project types	1
4	**VR components and techniques**	
4.1	VR frameworks, Practical Understanding of real world VR application development	1
4.2	VR methodologies and project types	1
4.3	Navigation and Manipulation Interface techniques in Blender.	1
5	**Application Using Unity**	
5.1	AR advanced SDKs, AR core & Kit, AR spark studio	1
5.2	Vuforia engine, perform preliminary data quality and formatting	1
5.3	Hands on Unity Software and Use case applications, Purpose of Wikitude and 8th wall tools	1
6	**Project**	
6.1	Problem Identification	05
6.2	Solution for Problem	05
6.3	Implementation	20
6.4	Presentation	20
6.5	Report	05
6.6	Demo	05

Course Designer(s)

1. Mrs.R.S.Sivaranjani – Sivaranjani.rs@ksrct.ac.in

Passed in BoS Meeting held on 24/05/2024

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

BoS Chairman Signature