K.S. Rangasamy College of Technology

(Autonomous Institution affiliated to Anna University, Chennai)

CURRICULUM AND SYLLABI

FOR

M.E., COMPUTER SCIENCE AND ENGINEERING

(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 Computer Science and Engineering

VISION

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

MISSION

- To produce competent software developers, system designers and network programmers through innovative teaching-learning practices.
- To keep abreast of the latest developments and technological transformations in computer science and engineering for social benefits.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

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: An ability to independently carry out research /investigation and development work to solve practical problems

PO2: An ability to write and present a substantial technical report/document

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

PO4: Create and develop computer programmes and computer-based systems in the fields of security, web design, and artificial intelligence,

PO5: Demonstrate the impact of the professional engineering solutions in societal and environmental contexts for sustainable development.

PO6: Recognize the need of autonomous, lifelong learning in the context of technological change, and possess the necessary skills and readiness.

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

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

Programme Educational Objectives	PO1	PO2	PO3	PO4	PO5	PO6
PEO 1	3	1	3	2	2	1
PEO 2	3	3	3	2	2	1
PEO 3	3	2	3	2	2	1

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

MAPPING-PG – M.E., (Computer Science and Engineering)

K.S. RANGASAMY COLLEGE OF TECHNOLOGY

Credit Distribution for M.E (CSE) Programme–2022 –2023 Batch

S.No.	Category	Credits Per Semester				Total Credits	Percentage %
		I	II	III	IV		
1.	PC	16	10	3	-	29	39.73
2.	PE	3	9	6	-	18	24.66
3.	AC	0	0	-	-	0	0
4.	CGC	-	-	10	16	26	35.61
Total		19	19	19	16	**73**	**100**

PC – PROFESSIONAL CORE
PE – PROFESSIONAL ELECTIVES
AC – AUDIT COURSES
CGC - CAREER GUIDANCE COURSES

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

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CONCEIVE DEVELOP IMPLEMENT EXECUTE (CDIE)

PROFESSIONAL CORE (PC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 PCS 101	Mathematical Foundation of Computer Science	PC	3	3	0	0	3
2.	60 PCS 102	Data Structures and Algorithms	PC	3	3	0	0	3
3.	60 PCS 103	Networking Technologies	PC	3	3	0	0	3
4.	60 PED 001	Research Methodology and IPR	PC	3	3	0	0	3
5.	60 PCS 1P1	Data Structures and Algorithms Laboratory	PC	4	0	0	4	2
6.	60 PCS 1P2	Networking Laboratory	PC	4	0	0	4	2
7.	60 PCS 201	Advanced Software Engineering	PC	3	3	0	0	3
8.	60 PCS 202	Machine Learning	PC	3	3	0	0	3
9.	60 PCS 2P1	Machine Learning Techniques Laboratory	PC	4	0	0	4	2
10	60 PCS 2P2	Software Engineering Laboratory	PC	4	0	0	4	2
11	60 PCS 301	Compiler Optimization Techniques	PC	3	3	0	0	3

PROFESSIONAL ELECTIVES - I (PE)

S.No.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
1.	60 PCS E10	Advanced Database Technology and Design	PE	3	3	0	0	3
2.	60 PCS E11	Smart Sensors and Internet of Things	PE	3	3	0	0	3
3.	60 PCS E12	Cloud Computing Technologies	PE	3	3	0	0	3
4.	60 PCS E13	Information Retrieval Techniques	PE	3	3	0	0	3
5.	60 PCS E19	Deep Learning	PE	3	3	0	0	3

PROFESSIONAL ELECTIVES - II (PE)

S.No.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
1.	60 PCS E21	Data Warehousing and Data Mining	PE	3	3	0	0	3
2.	60 PCS E23	Cryptocurrency and Blockchain Technologies	PE	3	3	0	0	3
3.	60 PCS E25	Web Data Mining	PE	3	3	0	0	3
4.	60 PCS E28	Cyber Security	PE	3	3	0	0	3
5.	60 PCS E29	Soft Computing	PE	3	3	0	0	3

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PROFESSIONAL ELECTIVES - III (PE)

S.No.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
1.	60 PCS E30	Social Network Analysis	PE	3	3	0	0	3
2.	60 PCS E31	Software Testing and Quality Assurance	PE	3	3	0	0	3
3.	60 PCS E35	Big Data Analytics	PE	3	3	0	0	3
4.	60 PCS E38	Multi Core Architectures	PE	3	3	0	0	3
5.	60 PCS E39	Data Encryption and Compression	PE	3	3	0	0	3

PROFESSIONAL ELECTIVES - IV (PE)

S.No.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
1.	60 PCS E41	Mobile and Pervasive Computing	PE	3	3	0	0	3
2.	60 PCS E43	Data Preparation and Analysis	PE	3	3	0	0	3
3.	60 PCS E44	Protocols and Architecture for Mobile ad-hoc networks	PE	3	3	0	0	3
4.	60 PCS E45	Secure Coding	PE	3	3	0	0	3
5.	60 PCS E47	Wireless Sensor Networks	PE	3	3	0	0	3

PROFESSIONAL ELECTIVES - V (PE)

S.No.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
1.	60 PCS E51	Natural Language Processing	PE	3	3	0	0	3
2.	60 PCS E52	Web Analytics and Development	PE	3	3	0	0	3
3.	60 PCS E53	Human and Computer Interaction	PE	3	3	0	0	3
4.	60 PCS E54	Malware Analysis and Reverse Engineering	PE	3	3	0	0	3
5.	60 PCS E55	Image Processing and Analysis	PE	3	3	0	0	3

PROFESSIONAL ELECTIVES - VI (PE)

S.No.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
2.	60 PCS E61	Game Theory	PE	3	3	0	0	3
3.	60 PCS E62	Adhoc and Wireless Sensor Networks	PE	3	3	0	0	3
4.	60 PCS E63	Recommender System	PE	3	3	0	0	3
7.	60 PCS E64	Virtualization Techniques	PE	3	3	0	0	3
8.	60 PCS E65	Database Administration and Tuning	PE	3	3	0	0	3

SEMESTER I, SEMESTER II & SEMESTER III, AUDIT COURSES (AC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 PAC 001	English for Research Paper Writing	AT	2	2	0	0	0
2.	60 PAC 002	Disaster Management	AT	2	2	0	0	0
3.	60 PAC 003	Sanskrit for Technical Knowledge	AT	2	2	0	0	0
4.	60 PAC 004	Value Education	AT	2	2	0	0	0
5.	60 PAC 005	Pedagogy Studies	AT	2	2	0	0	0

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6.	60 PAC 006	Stress Management by Yoga	AT	2	2	0	0	0
7.	60 PAC 007	Personality Development through Life Enlightenment Skills	AT	2	2	0	0	0
8.	60 PAC 008	Constitution of India	AT	2	2	0	0	0

CAREER GUIDANCE COURSES (CGC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 PCS 3P1	Project Work Phase-I/Industrial Project	CGC	20	0	0	20	10
2.	60 PCS 4P1	Project Work Phase -II	CGC	32	0	0	32	16

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COURSES OF STUDY

(For the candidates admitted from 2022-2023 onwards)

SEMESTER I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 PCS 101	Mathematical Foundation of Computer Science	PC	3	3	0	0	3
2.	60 PCS 102	Data Structures and Algorithms	PC	3	3	0	0	3
3.	60 PCS 103	Networking Technologies	PC	3	3	0	0	3
4.	60 PED 001	Research Methodology and IPR	PC	3	3	0	0	3
5.	60 PCS E1*	Professional Elective I	PE	3	3	0	0	3
6.	60 PAC 001	English for Research Paper Writing	AC	2	2	0	0	0
PRACTICALS								
7.	60 PCS 1P1	Data Structures and Algorithms Laboratory	PC	4	0	0	4	2
8.	60 PCS 1P2	Networking Laboratory	PC	4	0	0	4	2
			Total	**25**	**17**	**0**	**8**	**19**

SEMESTER II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 PCS 201	Advanced Software Engineering	PC	3	3	0	0	3
2.	60 PCS 202	Machine Learning	PC	3	3	0	0	3
3.	60 PCS E2*	Professional Elective II	PE	3	3	0	0	3
4.	60 PCS E3*	Professional Elective III	PE	3	3	0	0	3
5.	60 PCS E4*	Professional Elective IV	PE	3	3	0	0	3
6.	60 PAC 002	Disaster Management	AC	2	2	0	0	0
PRACTICALS								
7.	60 PCS 2P1	Machine Learning Techniques Laboratory	PC	4	0	0	4	2
8.	60 PCS 2P2	Software Engineering Laboratory	PC	4	0	0	4	2
			Total	**25**	**17**	**0**	**8**	**19**

SEMESTER III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 PCS 301	Compiler Optimization Techniques	PC	3	3	0	0	3
2.	60 PCS E5*	Professional Elective V	PE	3	3	0	0	3
3.	60 PCS E6*	Professional Elective VI	PE	3	3	0	0	3
PRACTICALS								
5.	60 PCS 3P1	Project Work Phase I	CGC	20	0	0	20	10
			Total	**29**	**9**	**0**	**20**	**19**

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SEMESTER IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
PRACTICALS								
1.	60 PCS 4P1	Project Work Phase II	CGC	32	0	0	32	16
			Total	**32**	**0**	**0**	**32**	**16**

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 73

Note:, PC-Professional Core Courses, PE-Professional Elective Courses, CGC- Career Guidance Courses & AT-Audit Courses

L : Lecture
T : Tutorial
P : Practical

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M.E. / M.Tech. Degree Programme

SCHEME OF EXAMINATIONS
(For the candidates admitted from 2022-2023 onwards)

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 PCS 101	Mathematical Foundation of Computer Science	2	40	60	100	45	100
2.	60 PCS 102	Data Structures and Algorithms	2	40	60	100	45	100
3.	60 PCS 103	Networking Technologies	2	40	60	100	45	100
4.	60 PED 001	Research Methodology and IPR	2	40	60	100	45	100
5.	60 PCS E1*	Professional Elective I	2	40	60	100	45	100
6.	60 PAC 001	English for Research Paper Writing	2	100	-	100	-	100
PRACTICAL								
7.	60 PCS 1P1	Data Structures and Algorithms Laboratory	3	60	40	100	45	100
8.	60 PCS 1P2	Networking Laboratory	3	60	40	100	45	100

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 PCS 201	Advanced Software Engineering	2	40	60	100	45	100
2.	60 PCS 202	Machine Learning	2	40	60	100	45	100
3.	60 PCS E2*	Professional Elective II	2	40	60	100	45	100
4.	60 PCS E3*	Professional Elective III	2	40	60	100	45	100

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5.	60 PCS E4*	Professional Elective IV	2	40	60	100	45	100
6.	60 PAC 002	Disaster Management	2	100	-	100	-	100
PRACTICAL								
7.	60 PCS 2P1	Machine Learning Techniques Laboratory Laboratory	3	60	40	100	45	100
8.	60 PCS 2P2	Software Engineering Laboratory	3	60	40	100	45	100

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 PCS 301	Compiler Optimization Techniques	2	40	60	100	45	100
4.	60 PCS E5*	Professional Elective V	2	40	60	100	45	100
5.	60 PCS E6*	Professional Elective VI	2	40	60	100	45	100
PRACTICAL								
7.	60 PCS 3P1	Project Work Phase I	2	100	-	100	-	100

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
PRACTICAL								
7.	60 PCS 4P1	Project Work Phase I	2	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 the award of terminal examination marks.

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60 PCS 101	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- To develop the skills in the fields of theory of estimation.
- To familiarize number theory and its applications.
- To widen knowledge about basics of formal languages and automata theory.
- To understand the concepts of transportation and assignment models.
- To get exposed to scheduling by PERT and CPM.

Prerequisite

NIL

Course Outcomes

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

CO1	Understand the fundamentals of theory of estimation.	Remember, Understand, Analyze
CO2	Apply the basic properties of number theory.	Remember, Apply
CO3	Identify the language in deterministic and non-deterministic finite state automation.	Remember, Understand, Analyze
CO4	Employ the different techniques for solving transportation and assignment models.	Remember, Understand, Apply
CO5	Apply PERT/CPM methods to evaluate the core tasks within complicated operations.	Remember, Apply, Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	2	2	
CO2	3	3	3	2	2	
CO3	3	3	3	2	2	
CO4	3	3	3	2	2	
CO5	3	3	3	2	2	

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	10
Understand (Un)	10	10	20
Apply (Ap)	20	20	30
Analyze (An)	20	20	30
Evaluate (Ev)	0	0	10
Create (Cr)	0	0	0

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K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS 101 - Mathematical Foundation of Computer Science								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Theory of Estimation Estimation theory: Point estimation – Unbiased estimator – Consistency estimator – Efficiency estimator and sufficiency estimator – Method of point estimation – Method of Maximum Likelihood - Method of Moments–Interval estimation - Confidence intervals.	**[9]**
Number Theory Divisibility – Prime Numbers –Fundamental theorem of Arithmetic – The Sieve of Eratosthenes – Division Procedure – Greatest Common Division – Alternative Definition of GCD - Least Common Multiple –Congruence – Congruence Class Modulo m – Linear Congruence - The Chinese Remainder Theorem.	**[9]**
Formal Languages and Automata Theory Finite state machines – Deterministic and Non-deterministic finite state machines –Turing Machines – Formal Languages – Classes of Grammars –Type 0–Context Sensitive – Context Free – Regular Grammars – Ambiguity.	**[9]**
Transportation and Assignment Models Mathematical formulation of transportation problem – Methods for finding initial basic feasible solution – Optimal solution – Degeneracy – Mathematical formulation of assignment models– Hungarian algorithm – The Travelling Salesman Problem.	**[9]**
Scheduling by PERT and CPM Network construction – Critical path method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling.	**[9]**
Total Hours	**45**

Text book(s):

1.	Veerarajan T., "Discrete Mathematics with Graph Theory and Combinatorics" TataMcGraw-Hill, Eighth Reprint 2009.
2.	KantiSwarup, Gupta P.K., Man Mohan, "Operations Research", Sultan Chand and Sons.

Reference(s):

1.	Kapur J.N. and Saxena H.C., "Mathematical Statistics" ,S.Chand& Company Ltd., New Delhi, 2003.
2.	Gupta.S.C. "Fundamentals of Statistics" Himalaya Publishing House, Mumbai,Reprint 2011.
3.	Arora P.N. and Arora S, "Statistics for Management", S.Chand& Company Ltd., New Delhi, 2003.
4.	Kenneth H Rosen, "Discrete Mathematics and its Applications", McGraw Hill Education (India) Pvt. Ltd, New Delhi, 2007.
5.	Dr.G. Srinivasan, "Introduction to Operations Research", NPTEL online video courses.

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**Theory of Estimation**	
1.1	Introduction to Estimation theory	1
1.2	Point estimation	1
1.3	Unbiased estimator and Consistency estimator	1
1.4	Efficiency estimator and Sufficiency estimator	1
1.5	Method of point estimation	1
1.6	Method of Maximum Likelihood	1
1.7	Method of Moments	1
1.8	Interval estimation	1

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1.9	Confidence intervals.	1
2	**Number Theory**	
2.1	Divisibility and Prime Numbers	1
2.2	Fundamental theorem of Arithmetic	1
2.3	The Sieve of Eratosthenes	1
2.4	Division Procedure : Greatest Common Division	1
2.5	Alternative Definition of GCD and Least Common Multiple	1
2.6	Congruence : Congruence Class Modulo m	2
2.7	Linear Congruence	1
2.8	The Chinese Remainder Theorem.	1
3	**Formal Languages And Automata Theory**	
3.1	Introduction to Automata Theory	1
3.2	Deterministic finite state machines	1
3.3	Non-deterministic finite state machines	1
3.4	Turing Machines	1
3.5	Introduction to Formal Languages	1
3.6	Classes of Grammars : Type 0	1
3.7	Context Sensitive and Context Free	2
3.8	Regular Grammars: Ambiguity.	1
4	**Transportation And Assignment Models**	
4.1	Mathematical formulation of transportation problem	1
4.2	Methods for finding initial basic feasible solution	2
4.3	Methods for finding Optimal solution	1
4.4	Degeneracy	1
4.5	Mathematical formulation of Assignment models	1
4.6	Hungarian algorithm	1
4.7	The Travelling Salesman Problem	2
5	**Scheduling By PERT And CPM**	
5.1	Network construction	3
5.2	Critical path method	2
5.3	Project Evaluation and Review Technique	2
5.4	Resource Analysis in Network Scheduling.	2
	Total	45

Course Designers

1. Dr. K.Kiruthika - kiruthika@ksrct.ac.in
2. Ms. V.Thivya - thivya@ksrct.ac.in

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60 PCS 102	Data Structures and Algorithms

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- To extend the students' knowledge of algorithms and data structures.
- To enhance their expertise in algorithmic analysis and algorithm design techniques.
- To understand various types of search and heap structures.
- To study various types of geometric, randomized and approximation algorithms.
- To extrapolate from them in order to apply those algorithms and techniques to solve

Prerequisite

NIL

Course Outcomes

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

CO1	Analyze algorithms.	Analyse
CO2	Determine algorithm correctness.	Apply
CO3	Choose appropriate data structures for the problems to be solved.	Apply
CO4	Design algorithms for problems from different domains.	Analyse
CO5	Identify various research strategies on algorithmic design.	Remember

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	3	2			
CO2	1	3	2	2		
CO3	1	3	2	2	2	
CO4	1	3	2	2	3	
CO5	1	3	2		2	

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	10	10	20
Apply (Ap)	20	20	30
Analyze (An)	20	20	30
Evaluate (Ev)	-	-	-
Create (Cr)	-	-	-

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K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS 102 - Data Structures and Algorithms								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Fundamentals Properties of Big-oh Notation –Conditional Asymptotic Notation – Algorithm Analysis – Amortized Analysis – Introduction to NP-Completeness/NP-Hard – Recurrence Equations – Solving Recurrence Equations –Time-Space Tradeoff.	**[9]**
Search Structures Binary Search Trees – AVL Trees – Red-Black trees – Multi-way Search Trees –B-Trees – Splay Trees –Tries	**[9]**
Heap Structures Min/Max heaps – Deaps – Leftist Heaps – Binomial Heaps – Fibonacci Heaps – Skew Heaps – Lazy Binomial	**[9]**
Geometric Algorithms Segment Trees – 1-Dimensional Range Searching – k-d Trees – Line Segment Intersection – Computingthe Overlay of Two Subdivisions – Range Trees – Voronoi Diagram	**[9]**
Additional Topics Approximation Algorithms: Vertex Cover & Euclidean Travelling Salesperson Problem – Randomized Algorithms: Closest Pair Problem & Minimum Spanning Trees – Online Algorithm: Euclidean Spanning Tree.	**[9]**
Total Hours	**45**

Reference(s):

1. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”,SecondEdition, University Press, 2008.
2. Gilles Brassard, Paul Bratley, “Algorithmics: Theory and Practice”, Prentice Hall, 1988.
3. Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars, “Computational Geometry Algorithmsand Applications”, Third Edition, Springer, 2008.
4. R.C.T Lee, S.S Tseng, R.C Chang and Y.T Tsai, “Introduction to the Design and Analysis of Algorithms”,Tata McGraw-Hill Edition, 2012.
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, MIT Press, 2009.

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Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Fundamentals**	
1.1	Properties of Big-oh Notation	1
1.2	Conditional Asymptotic Notation	1
1.3	Algorithm Analysis	1
1.4	Amortized Analysis	1
1.5	Introduction to NP-Completeness/NP-Hard	2
1.6	Recurrence Equations	1
1.7	Solving Recurrence Equations	1
1.8	Time-Space Tradeoff	1
2	**Search Structures**	
2.1	Binary Search Trees	1
2.2	AVL Trees	2
2.3	Red-Black trees	2
2.4	Multi-way Search Trees	1
2.5	B-Trees	1
2.6	Splay Trees	1
2.7	Tries	1
3	**Heap Structures**	
3.1	Min/Max heaps	2
3.2	Deaps	1
3.3	Leftist Heaps	1
3.4	Binomial Heaps	2
3.5	Fibonacci Heaps	1
3.6	Skew Heaps	1
3.7	Lazy Binomial	1
4	**Geometric Algorithms**	
4.1	Segment Trees	2
4.2	1-Dimensional Range Searching	1
4.3	k-d Trees	1
4.4	Line Segment Intersection	1
4.5	Computing the Overlay of Two Subdivisions	2
4.6	Range Trees	1
4.7	Voronoi Diagram	1
5	**Additional Topics**	
5.1	Algorithms:	2
5.2	Closest Pair Problem	2
5.3	Minimum Spanning Trees	2
5.4	Online Algorithm:	2
5.5	Euclidean Spanning Tree	1
	Total	45

Course Designers

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

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS 103	Networking Technologies	Category	L	T	P	Credit
		PC	3	0	0	3

Objective
• To learn about integrated and differentiated services architectures.
• To understand the working of wireless network protocols.
• To study the developments in cellular networks.
• To get familiarized with next generation networks.
• To know the concepts behind software defined networks.

Prerequisite
NIL

Course Outcomes		
On the successful completion of the course, students will be able to		
CO1	Identify the different features of integrated and differentiated services.	Understand
CO2	Demonstrate various protocols of wireless networks.	Apply
CO3	Analyze the use of next generation networks.	Analyze
CO4	Provide solutions using SDN	Apply
CO5	Design protocols for cellular networks	Create

Mapping with Programme Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	3	2	1	1	2	-
CO2	1	1	1	2	1	-
CO3	1	2	1	2	1	-
CO4	1	2	1	2	1	-
CO5	1	1	1	3	1	-

3 – Strong; 2 – Medium; 1 – Some

Assessment pattern

Bloom's Category	**Continuous Assessment Tests (marks)**		**End Semester Examination (Marks)**
	1	**2**	
Remember (Rm)	10	10	20
Understand (Un)	20	10	30
Apply (Ap)	10	10	20
Analyse (An)	10	10	20
Evaluate (Ev)	-	-	-
Create (Cr)	-	10	10

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS 103 - Networking Technologies								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Network Architecture And Qos Overview of TCP/IP Network Architecture – Integrated Services Architecture – Approach – Components – Services – Queuing Discipline – FQ – PS – BRFQ – GPS – WFQ – Random Early Detection – Differentiated Services	**[9]**
Wireless Networks IEEE 802.16 and WiMAX – Security – Advanced 802.16 Functionalities – Mobile WiMAX – 802.16e – Network Infrastructure – WLAN – Configuration – Management Operation – Security – IEEE 802.11e and WMM – QoS – Comparison of WLAN and UMTS – Bluetooth – LiFi – Protocol Stack – Security – Profiles	**[9]**
Cellular Networks GSM – Mobility Management and call control – GPRS – Network Elements – Radio Resource Management – Mobility Management and Session Management – Small Screen Web Browsing over GPRS and EDGE – MMS over GPRS – UMTS – Channel Structure on the Air Interface – UTRAN –Core and Radio Network Mobility Management – UMTS Security	**[9]**
4G Networks LTE – Network Architecture and Interfaces – FDD Air Interface and Radio Networks – Scheduling – Mobility Management and Power Optimization – LTE Security Architecture – Interconnection with UMTS and GSM – LTE Advanced (3GPPP Release 10) – 4G Networks and Composite Radio Environment – Protocol Boosters – Hybrid 4G Wireless Networks Protocols – Green Wireless Networks – Physical Layer and Multiple Access – Channel Modelling for 4G – Introduction to 5G &. XG networks	**[9]**
Software Defined Networks Introduction – Centralized and Distributed Control and Data Planes – Open Flow – SDN Controllers – General Concepts – VLANs – NVGRE – Open Flow – Network Overlays – Types – Virtualization – Data Plane – I/O – Design of SDN Framework	**[9]**
Total Hours	**45**

Reference(s):

William Stallings, “High Speed Networks and Internets: Performance and Quality of Service”, Prentice Hall, Second Edition, 2002.

Martin Sauter, “From GSM to LTE, An Introduction to Mobile Networks and Mobile Broadband”, Wiley, 2014.

Savo G Glisic, “Advanced Wireless Networks – 4G Technologies”, John Wiley & Sons, 2007.

Jonathan Rodriguez, “Fundamentals of 5G Mobile Networks”, Wiley, 2015.

Jonathan Rodriguez, “Fundamentals of 5G Mobile Networks”, Wiley, 2015.

Martin Sauter, “Beyond 3G – Bringing Networks, Terminals and the Web Together: LTE, WiMAX, IMS, 4G Devices and the Mobile Web 2.0”, Wiley, 2009.

Naveen Chilamkurti, SheraliZeadally, HakimaChaouchi, “Next-Generation Wireless Technologies”, Springer, 2013.

Erik Dahlman, Stefan Parkvall, Johan Skold, “4G: LTE/LTE-Advanced for Mobile Broadband”, Academic Press, 2013.

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Course Contents and Lecture Schedule		
S.No	**Topic**	**No. of Hours**
1	**Network Architecture And Qos**	
1.1	Overview of TCP/IP Network Architecture	1
1.2	Integrated Services Architecture: Approach, Components, Services	2
1.3	Queuing Discipline: FQ,PS,BRFQ,GPS, WFQ	2
1.4	Random Early Detection	2
1.5	Differentiated Services	2
2	**Wireless Networks**	
2.1	IEEE 802.16 and WiMAX and Security	1
2.2	Advanced 802.16 Functionalities – Mobile WiMAX – 802.16e	1
2.3	Network Infrastructure	1
2.4	WLAN: Configuration ,Management Operation, Security	1
2.5	IEEE 802.11e and WMM	1
2.6	QoS	1
2.7	Comparison of WLAN and UMTS	1
2.8	Bluetooth and LiFi	1
2.9	Protocol stack and security and profiles	1
3	**Cellular Networks**	
3.1	GSM - Mobility Management and call control	1
3.2	GPRS - Network Elements	1
3.3	Radio Resource Management	1
3.4	Mobility Management and Session Management	1
3.5	Small Screen Web Browsing over GPRS and EDGE	1
3.6	MMS over GPRS	1
3.7	UMTS - Channel Structure on the Air Interface	1
3.8	UTRAN - Core and Radio Network Mobility Management	1
3.9	UMTS Security	1
4	**4G Networks**	
4.1	LTE – Network Architecture and Interfaces	1
4.2	FDD Air Interface and Radio Networks –Scheduling	1
4.3	Mobility Management and Power Optimization	1
4.4	LTE Security Architecture – Interconnection with UMTS and GSM	1
4.5	LTE Advanced (3GPPP Release 10) – 4G Networks and Composite Radio Environment –	1
4.6	Protocol Boosters – Hybrid 4G Wireless Networks Protocols – Green Wireless Networks	1
4.7	Physical Layer and Multiple Access	1
4.8	Channel Modelling for 4G	1
4.9	Introduction to 5G &. XG networks	1
5	**Software Defined Networks**	
5.1	Introduction	1
5.2	Centralized and Distributed Control and Data Planes – Open Flow	1
5.3	SDN Controllers – General Concepts	1
5.4	VLANs – NVGRE – Open Flow	2
5.5	Network Overlays – Types	1
5.6	Virtualization	1
5.7	Data Plane	1
5.8	I/O – Design of SDN Framework	1
	Total	**45**
Course Designers		
1. Mr.P.THANGAMARIAPPAN – thangamariappan@ksrct.ac.in		

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PED 001	**Research Methodology and IPR**	Category	L	T	P	Credit
		PC	3	0	0	3

Objective
• To understand the research process and design
• To gain the knowledge about sources and collection of research data
• To understand the procedure of data analysis and preparation of reports
• To gain the knowledge on intellectual property rights
• To enlighten the system of patents and benefits

Prerequisite		
NIL		
Course Outcomes		
On the successful completion of the course, students will be able to		
CO1	To understand the research process and design.	Understand
CO2	To gain the knowledge about sources and collection of research data	Analyse
CO3	To understand the procedure of data analysis and preparation of reports.	Analyse
CO4	To gain the knowledge on intellectual property rights.	Understand
CO5	To enlighten the system of patents and benefits	Understand
Mapping with Programme Outcomes		

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	3	3	2	2	2	
CO2	3	3	3	3	2	2
CO3	3	2	2	3	3	
CO4	2	3	3	2	2	1
CO5	2	3	2	2	3	

3 – Strong; 2 – Medium; 1 – Some

Assessment pattern

Bloom's Category	**Continuous Assessment Tests (marks)**		**End Semester Examination (Marks)**
	1	**2**	
Remember (Rm)	10	10	15
Understand (Un)	20	20	15
Apply (Ap)	10	10	15
Analyse (An)	20	20	15
Evaluate (Ev)	-	-	-
Create (Cr)	-	-	-

Passed in BoS Meeting held on 20/05/23
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BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PED 001 - Research Methodology and IPR								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Research Design Overview of research process and design- Use of Secondary and exploratory data to answer the research question, Qualitative research, Observation studies, Experiments and Surveys, Selection of the Right Medium and Journal for publication, Translation of Research	**[9]**
Data Collection and Sources Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data - Preparing, Exploring, examining and displaying.	**[9]**
Data Analysis and Reporting Overview of Multivariate Analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation. Checks for Plagiarism, Falsification, Fabrication, and Misrepresentation	**[9]**
Intellectual Property Rights Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Bio diversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance	**[9]**
Patents Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification, Types of patent application, process E-filling, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents	**[9]**
Total Hours	**45**

Text Books :	
1.	David I. Bainbridge, “Intellectual Property”, Longman, 9th Edition, 2012.
2.	Cooper Donald R, Schindler Pamela S and Sharma JK, “Business Research Methods”, Tata McGraw Hill Education, 11e (2012).
References:	
1.	hawla H S., “Introduction to Intellectual Property Rights”, CBS PUB & DIST PVT Limited, INDIA, 2019.
2.	Catherine J. Holland, “Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets”, Entrepreneur Press, 2007
3.	David Hunt, Long Nguyen, Matthew Rodgers, “Patent searching: tools & techniques”, Wiley, 2007
4.	Arun K. Narasani, Kankanala K.C., Radhakrishnan V., “Indian Patent Law and Practice”, Oxford University Press, 2010.
5.	Richard Stim, “Patent, Copyright & Trademark - An Intellectual Property Desk Reference”, NOLO Publishers, 2020.
6.	The Institute of Company Secretaries of India, Statutory body under an Act of parliament, “Professional Programme Intellectual Property Rights, Law and practice”, September 2013.

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

Course Contents and Lecture Schedule		
S.No	**Topic**	**No.of Hours**
	Research Design	
1.	Introduction of research process and design	**1**
2.	Use of Secondary and exploratory data	1
3.	Qualitative research	1
4.	Observation studies in research design	1
5.	Research Questionaire	1
6.	Journal for publication	1
7.	Translation of Research	1
8.	Experiments and Surveys	1
9.	Selection of the Right Medium in Research	1
	Data Collection and Sources	
1.	Measurements	1
2.	Measurement Scales	2
3.	Questionnaires	1
4.	Instruments	2
5.	Sampling and methods	1
6.	Data - Preparing, Exploring, examining and displaying.	2
	Data Analysis and Reporting	
1.	Overview of Multivariate Analysis	1
2.	Hypotheses testing and Measures of Association	1
3.	Presenting Insights	2
4.	Checks for Plagiarism	1
5.	Falsification	2
6.	Fabrication	1
7.	Misrepresentation	1
	Intellectual Property Rights	
1.	Intellectual Property	1
2.	The concept of IPR	1
3.	Trade secrets	1
4.	utility Models	1
5.	IPR & Bio diversity	1
6.	Role of WIPO and WTO	1
7.	IPR establishments	1
8.	Types and Features of IPR Agreement	1
9.	Functions of UNESCO in IPR maintenance	1
	Patents	
1.	Introduction to Patents	1
2.	objectives and benefits of patent	1
3.	Features of patent	1
4.	Inventive step	1
5.	Equitable Assignments	1
6.	Licenses	1
7.	Equitable Assignments	1
8.	Patent agents	1
9.	Licensing of related patents	1
Course Designers		
M. VARSHANA DEVI – varshanadevi@ksrct.ac.in		

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PAC 001	ENGLISH FOR RESEARCH PAPER WRITING

Category	L	T	P	Credit
AC	2	0	0	0

Objective

- Teach how to improve writing skills and level of readability
- Tell about what to write in each section
- Summarize the skills needed when writing a Title
- Infer the skills needed when writing the Conclusion
- Ensure the quality of paper at very first-time submission

Prerequisite

NIL

Course Outcomes

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

CO1	Understand that how to improve your writing skills and level of readability	Understand
CO2	Learn about what to write in each section	Understand
CO3	Understand the skills needed when writing a Title	Understand
CO4	Understand the skills needed when writing the Conclusion	Understand
CO5	Ensure the good quality of paper at very first-time submission	Analyse

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	1	1	3	1	-
CO2	1	1	1	2	1	-
CO3	1	1	1	3	1	3
CO4	1	3	3	-	1	-
CO5	1	1	1	3	1	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)	
	1	**2**
Remember	10	10
Understand	20	20
Apply	30	30
Analyse	0	0
Evaluate	0	0
Create	0	0

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PAC 001 - English for Research Paper Writing								
Common to all Branches								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total

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I / II	2	0	0	30	0	100	-	100

Introduction to Research Paper Writing Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	[6]
Presentation Skills Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction	[6]
Title Writing Skills Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check	[6]
Result Writing Skills Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions	[6]
Verification Skills Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first time submission	[6]
Total Hours	**30**

Text Book(s):

1.	Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011
2	Day R How to Write and Publish a Scientific Paper, Cambridge University Press 2006

Reference(s):

1.	Goldbort R Writing for Science, Yale University Press (available on Google Books) 2006
2.	Highman N, Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book 1998.
3.	Phill Williams, Advanced Writing skills for students of English, Rumian Publishers, 2018
4.	Sudhir S. Pandhye, English Grammar and Writing Skills, Notion Press, 2017.

60 PCS 1P1	Data Structures and Algorithms Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objective
• To familiarize various data structure implementations
• To implement heap and various tree structures like AVL, Red-black, B-Tree and segment trees
• To understand efficient implementation of line segment intersection
• To understand various search structures
• To get understanding of problem to program mapping

Prerequisite
NIL
Course Outcomes
On the successful completion of the course, students will be able to

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CO1	Achieve programming skill to convert a problem to a programming logic	Evaluate
CO2	Apply suitable data structure for the problem in hand	Create
CO3	Implement heap and various tree structures like AVL, Red-black, B-Tree and segment trees	Evaluate
CO4	Understand the usage of data structures for geometric problems	Analyze
CO5	Understand the importance of height balancing in search structures	Create

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	1	1	3	1	-
CO2	1	1	1	2	1	-
CO3	1	1	1	3	1	3
CO4	1	3	3	-	1	-
CO5	1	1	1	3	1	-

3 – Strong; 2 – Medium; 1 – Some

K.S.Rangasamy College of Technology – Autonomous R2022

60 PCS 1P1 - Data Structures and Algorithms Laboratory

M.E. Computer Science and Engineering

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. Binary Search Trees
2. Min/Max Heaps
3. Leftist Heaps
4. AVL Trees
5. Red-Black Trees
6. B-Trees
7. Segment Trees
8. Line segment intersection

Total Hours **60**

Course Designers

1. Mrs.I.Kalaimani, kalaimani@ksrct,ac,in

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS 1P2	Networking Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objective
• Demonstrate the operation of wireless networks
• Simulate and analyze the performance of GSM, CDMA, LTE and SDN
• To gain knowledge and work on various protocol layers
• To explore network simulators
• Identify the different features of integrated and differentiated services

Prerequisite		
NIL		
Course Outcomes		
On the successful completion of the course, students will be able to		
CO1	Judge the emerging wireless technology standards	Evaluate
CO2	Configure functionalities of router and switches	Create
CO3	Assess the importance of wireless adhoc networks	Evaluate
CO4	Compare and contrast various wireless technologies	Analyze
CO5	Explain and design the considerations for deploying wireless network infrastructure	Create
Mapping with Programme Outcomes		

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	1	1	3	1	-
CO2	1	1	1	2	1	-
CO3	1	1	1	3	1	3
CO4	1	3	3	-	1	-
CO5	1	1	1	3	1	-

3 – Strong; 2 – Medium; 1 – Some

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS 1P2 - Networking Laboratory								
M.E. Computer Science and Engineering								
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) Configure networks using:
   a) Distance Vector Routing protocol
   b) Link State Vector Routing protocol
2) Implement the congestion control using Leaky bucket algorithm.
3) Installation of NS3 and execution of TCL commands / scripts.
4) Implementation Point to Point network using duplex links between the nodes. Analyze the packet transfer by varying the queue size and bandwidth. (using simulator)
5) Implement the dynamic routing protocol by varying the CBR traffic for each node and use a flow monitor( ) to monitor losses at nodes. (using simulator)
6) Create a wireless mobile ad-hoc network environment and implement the OLSR routing protocol. (using simulator)
7) Implement CDMA by assigning orthogonal code sequence for 5 stations, generate the CDMA code sequence and communicate between the stations using the generated code.
8) Create a GSM environment and implement inter and intra handover mechanisms. (using simulator)
9) In LTE environment implement Round Robin and Token Bank Fair Queue scheduler in MAC layer.
10) Write python script to create topology in Mininet and configure OpenFlow switches with POX controller to communicate between nodes.

Total Hours	**60**

Course Designers
1. Mr.P.THANGAMARIAPPAN – thangamariappan@ksrct.ac.in

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS 201	Advanced Software Engineering

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- To understand the rationale for software development process models
- To understand why the architectural design of software is important
- To understand the five important dimensions of dependability, namely, availability, reliability, safety, security, and resilience
- To understand the basic notions of a web service, web service standards, and service oriented architecture
- To understand the different stages of testing from testing during development of a software system

Prerequisite

NIL

Course Outcomes

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

CO1	Identify appropriate process models based on the Project requirements	Analyze
CO2	Understand the importance of having a good Software Architecture	Understand
CO3	Understand the five important dimensions of dependability, namely, availability, reliability, safety, security, and resilience	Understand
CO4	Understand the basic notions of a web service, web service standards, and service- oriented architecture	Understand
CO5	Be familiar with various levels of Software testing	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	1	1	2	1
CO2	3	3	1	2	1	1
CO3	3	2	3	3	1	
CO4	3	2	3	3	3	
CO5	1	1	3	3	1	
3 – Strong; 2 – Medium; 1 – Some						

Assessment Pattern

Cognitive Levels	Continuous Assessment Tests		End Semester Examination(Marks)
	1	2	
Remember	20	20	30
Understand	20	20	30
Apply	-	-	-
Analyse	20	20	40
Evaluate	-	-	-
Create	-	-	-

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K. S. Rangasamy College of Technology – Autonomous R2022								
60 PCS 201 – Advanced Software Engineering								
M.E. Computer Science and Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

SOFTWARE PROCESS &MODELING Prescriptive Process Models – Agility and Process – Scrum – XP – Kanban – DevOps– Prototype Construction – Prototype Evaluation – Prototype Evolution – Modelling – Principles – Requirements Engineering – Scenario-based Modelling – Class-based Modelling – Functional Modelling – Behavioral Modelling	[9]
SOFTWARE DESIGN Design Process - Design Concepts - Design Model - Architectural Design - Component Level Design -User Experience Design - Design for Mobility - Pattern Based Design	[9]
SYSTEM DEPENDABILITY AND SECURITY Dependable Systems – Dependability Properties – Sociotechnical Systems – Redundancy and Diversity – Dependable Processes – Formal Methods and Dependability – Reliability Engineering – Availability and Reliability – Reliability Requirements – Fault-tolerant Architectures – Programming for Reliability – Reliability Measurement – Safety Engineering – Safety-critical Systems – Safety Requirements – Safety Engineering Processes – Safety Cases – Security Engineering – Security and Dependability – Safety and Organizations – Security Requirements – Secure System Design – Security Testing and Assurance – Resilience Engineering – Cybersecurity – Sociotechnical Resilience – Resilient Systems Design	[9]
SERVICE-ORIENTED SOFTWARE ENGINEERING, SYSTEMSENGINEERINGANDREAL-TIME SOFTWARE ENGINEERING Service-oriented Architecture – RESTful Services – Service Engineering – Service Composition – Systems Engineering – Sociotechnical Systems – Conceptual Design – System Procurement – System Development – System Operation and Evolution – Real-time Software Engineering – Embedded System Design – Architectural Patterns for Real-time Software – Timing Analysis – Real time Operating Systems	[9]
SOFTWARE TESTING AND SOFTWARE CONFIGURATION MANAGEMENT Software Testing Strategy – Unit Testing – Integration Testing – Validation Testing – System Testing – Debugging – White-Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing – Software Configuration Management (SCM) – SCM Repository – SCM Process – Configuration Management for Web and Mobile Apps	[9]
Total Hours	**45**

Text Book(s):

1. Software Engineering: A Practitioner's Approach, 9th Edition. Roger Pressman and Bruce Maxim, McGraw-Hill 2019.
2. Software Engineering, 10th Edition, Ian Somerville, Pearson Education Asia 2016

Reference(s):

1. Software Architecture In Practice, 3 rd Edition, Len Bass, Paul Clements and Rick Kazman, Pearson India 2018
2. An integrated approach to Software Engineering, 3rd Edition, Pankaj Jalote, Narosa Publishing House, 2018
3. Fundamentals of Software Engineering, 5th Edition, Rajib Mall, PHI Learning Private Ltd, 2018

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BoS Chairman

Course Contents and Lecture Schedule

Course Contents and Lecture Schedule		
S.No	**Topic**	**No. of Hours**
1	**SOFTWARE PROCESS &MODELING**	
1.1	Prescriptive Process Models	1
1.2	Agility and Process, Scrum, XP, Kanban, DevOps	2
1.3	Prototype : Construction, Evaluation, Evolution	2
1.4	Modelling Principles and Requirements Engineering	2
1.5	Modelling : Scenario-based, Class-based, Functional, Behavioral	2
2	**SOFTWARE DESIGN**	
2.1	Design Process	1
2.2	Design Concepts	1
2.3	Design Model	1
2.4	Architectural Design	2
2.5	Component Level Design	1
2.6	User Experience Design	1
2.7	Design for Mobility	1
2.8	Pattern Based Design	1
3	**SYSTEM DEPENDABILITY AND SECURITY**	
3.1	Dependable Systems	1
3.2	Sociotechnical Systems	1
3.3	Formal Methods and Dependability	1
3.4	Fault-tolerant Architectures	1
3.5	Safety Engineering Processes	1
3.6	Security Engineering	1
3.7	Security Testing and Assurance	1
3.8	Cybersecurity	1
3.9	Sociotechnical Resilience	1
4	**SERVICE-ORIENTED SOFTWARE ENGINEERING,**	
4.1	Service-oriented Architecture	1
4.2	RESTful Services	1
4.3	Service Engineering	1
4.4	Systems Engineering	1
4.5	Conceptual Design	1
4.6	System Operation and Evolution	1
4.7	Real-time Software Engineering	1
4.8	Embedded System Design	1
4.9	Real-time Operating Systems	1
5	**SOFTWARE TESTING**	
5.1	Software Testing Strategy	1
5.2	Unit Testing	1
5.3	Integration Testing	1
5.4	Validation Testing	1
5.5	System Testing	1
5.6	White-Box Testing	1
5.7	Black-Box Testing	1
5.8	Software Configuration Management	1
5.9	Configuration Management for Web and Mobile Apps	1
	Total	**45**

Course Designers

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

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS 202	Machine Learning

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- To understand the concepts of Machine Learning
- To appreciate supervised learning and their applications
- To appreciate the concepts and algorithms of unsupervised learning
- To understand the theoretical and practical aspects of Probabilistic Graphical Models
- To appreciate the concepts and algorithms of advanced learning

Prerequisite

Machine Learning is a mathematical discipline, and students will benefit from a good background in probability, algebra, calculus and Programming

Course Outcomes

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

CO1	Understand the features of machine learning to apply on real world problems	Remember, Understand
CO2	Apply and analyse the various algorithms of supervised learning	Remember, Apply, Analyze
CO3	Characterize the machine learning algorithms as unsupervised learning and analyse the various unsupervised algorithms	Remember, Apply, Analyze
CO4	Learn the concepts of graphical models and methods	Remember, Understand, Apply
CO5	Design a learning model from appropriate data to the real world application	Analyze, Apply, Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
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	

Assessment Pattern

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

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K. S. Rangasamy College of Technology – Autonomous R2022								
60 PCS 202 – Machine Learning								
M.E. Computer Science and Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Introduction Machine Learning–Types of Machine Learning –Machine Learning process- preliminaries, testing Machine Learning algorithms, turning data into Probabilities, and Statistics for Machine Learning- Probability theory – Probability Distributions – Decision Theory	[9]
Supervised Learning Linear Models for Regression – Linear Models for Classification- Discriminant Functions, Probabilistic Generative Models, Probabilistic Discriminative Models – Decision Tree Learning – Bayesian Learning, Naïve Bayes – Ensemble Methods, Bagging, Boosting, Neural Networks, Multi-layer Perceptron, Feed-forward Network, Error Back propagation - Support Vector Machines	[9]
Unsupervised Learning Clustering- K-means – EM Algorithm- Mixtures of Gaussians –Dimensionality Reduction, Linear Discriminant Analysis, Factor Analysis, Principal Components Analysis, Independent Components Analysis.	[9]
Probabilistic Graphical Models Graphical Models – Undirected Graphical Models – Markov Random Fields – Directed Graphical Models –Bayesian Networks – Conditional Independence properties – Markov Random Fields- Hidden Markov Models – Conditional Random Fields(CRFs)	[9]
Advanced Learning Sampling-Basic Sampling methods, Monte Carlo, Gibbs Sampling – Computational Learning Theory – Mistake Bound Analysis – Reinforcement learning – Markov Decision processes, Deterministic and Non-deterministic Rewards and Actions, Temporal Difference Learning Exploration	[9]
Total Hours	**45**

References:

1.	Christopher Bishop, “Pattern Recognition and Machine Learning” Springer, 2007.
2.	Stephen Marsland, “Machine Learning – An Algorithmic Perspective”, Chapman andHall, CRC Press,
3.	Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012
4.	Ethem Alpaydin, “Introduction to Machine Learning”, MIT Press, Third Edition, 2014.
5.	Tom Mitchell, “Machine Learning”, McGraw-Hill, 1997

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**Introduction**	
1.1	Types of Machine Learning	1
1.2	Machine Learning process	1
1.3	Preliminaries algorithms	1
1.4	Testing - Machine Learning algorithms	1

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1.5	Turning data into Probabilities	1
1.6	Statistics for Machine Learning	1
1.7	Probability theory	1
1.8	Probability Distributions	1
1.9	Decision Theory	1
2	**Supervised Learning**	
2.1	Linear Models for Regression	1
2.2	Linear Models for Classification	1
2.3	Discriminant Functions & Probabilistic Generative Models	1
2.4	Probabilistic Discriminative Models	1
2.5	Decision Tree Learning	1
2.6	Bayesian Learning, Naïve Bayes	1
2.7	Ensemble Methods – Bagging & Boosting	1
2.8	Neural Networks, Multi-layerPerceptron, Feed- forward Network	1
2.9	Error Back propagation & Support Vector Machines	1
3	**Unsupervised Learning**	
3.1	Clustering - K-means	1
3.2	EM Algorithm	1
3.3	Mixtures of Gaussians	1
3.4	Dimensionality Reduction	1
3.5	Linear Discriminant Analysis	1
3.6	Factor Analysis	1
3.7	Principal Components Analysis	2
3.8	Independent Components Analysis	1
4	**Probabilistic Graphical Models**	
4.1	Graphical Models – Undirected Graphical Models	2
4.2	Markov Random Fields	2
4.3	Directed Graphical Models –Bayesian Networks	1
4.4	Conditional Independence properties	1
4.5	Markov Random Fields	1
4.6	Hidden Markov Models	1
4.7	Conditional Random Fields	1
5	**Advanced Learning**	
5.1	Sampling-Basic Sampling methods	2
5.2	Monte Carlo, Gibbs Sampling	1
5.3	Computational Learning Theory	1

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5.4	Mistake Bound Analysis	1
5.5	Reinforcement learning	1
5.6	Markov Decision processes	1
5.7	Deterministic andNon-deterministic Rewards and Actions	1
5.8	Temporal Difference Learning Exploration	1
	Total	45

Course Designers

1. Rajkumar S – rajkumars@ksrct.ac.in

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PAC 002	DISASTER MANAGEMENT

Category	L	T	P	Credit
AC	2	0	0	0

Objective

- Learn to demonstrate a critical understanding of key concepts in disaster riskreduction and humanitarian response.
- Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- To understand approaches of Disaster Management
- Develop an understanding of standards of humanitarian response and practicalrelevance in specific types of disasters and conflict situations.
- Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their homecountry or the countries they work in

Prerequisite

NIL

Course Outcomes

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

CO1	Understand the various hazards	Remember, Understand, Analyze
CO2	Analyze the situation during hazards and take necessary steps for protection	Understand, Apply
CO3	Know the risks involved in natural disaster	Remember, Understand, Analyze
CO4	Apply the knowledge of risk assessment and protect the public	Understand, Apply, Analyze
CO5	Create awareness about disaster and its management techniques among public	Remember, Apply, Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	2	3	
CO2	3	2	3	2	3	
CO3	3	2	3	2	3	
CO4	3	2	3	2	3	
CO5	3	2	3	2	3	
CO6	3	2	3	2	3	

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)	
	1	2
Remember (Re)	10	10
Understand (Un)	15	15
Apply (Ap)	20	20
Analyze (An)	15	15

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Evaluate (Ev)	0	0
Create (Cr)	0	0

K.S.Rangasamy College of Technology – Autonomous R2022

60 PAC 002 - DISASTER MANAGEMENT

M.E. Computer Science and Engineering

Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	2	0	0	30	0	100	-	100

Introduction Disaster: Definition, Factors And Significance; Difference Between Hazard and Disaster; Natural andManmade Disasters: Difference, Nature, Types and Magnitude.	[5]
Repercussions of Disasters and Hazards Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks AndSpills, Outbreaks of Disease And Epidemics, War And Conflicts.	[5]
Disaster Prone Areas in India Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides and Avalanches; Areas Prone to Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-DisasterDiseases and Epidemics	[5]
Disaster Preparedness and Management Preparedness: Monitoring of Phenomena Triggering A Disaster Or Hazard; Evaluation of Risk: Application of Remote Sensing, Data From Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.	[5]
Risk Assessment Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster RiskSituation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.	[5]
Disaster Mitigation Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends in Mitigation. StructuralMitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation in India.	[5]
Total Hours	**30**

Text book(s):

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.

Reference(s):

1. Damon Coppola, Introduction to International Disaster Management 3rd Edition, Butterworth-Heinemann , Published Date: 28th January 2015
2. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep&Deep Publication Pvt. Ltd., New Delhi.
3. Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
4. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.

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Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
	Unit-I Introduction	
1	Disaster: Definition, Factors And Significance	1
2	Difference Between Hazard and Disaster	1
3	Natural Disaster	1
4	Manmade Disaster	1
5	Nature, Types and Magnitude	1
	Unit-II Repercussions of Disasters and Hazards	
1	Economic Damage, Loss of Human and Animal Life	1
2	Destruction of Ecosystem	1
3	Natural Disasters:Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches	1
4	Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks AndSpills	1
5	Outbreaks of Disease And Epidemics, War And Conflicts	1
	Unit-III Disaster Prone Areas in India	
1	Study Of Seismic Zones	1
2	Areas Prone To Floods And Droughts	1
3	Landslides and Avalanches	1
4	Areas Prone to Cyclonic And Coastal Hazards With Special Reference To Tsunami	1
5	Post-Disaster Diseases and Epidemics	1
	Unit-IV Disaster Preparedness and Management	
1	Disaster Risk: Concept and Elements Disaster Risk Reduction	1
2	Global and National Disaster Risk Situation	1
3	Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning	1
4	People's Participation in Risk Assessment	1
5	Strategies for Survival	1
	Unit-VI Disaster Mitigation	
1	Meaning, Concept and Strategies of Disaster Mitigation	1
2	Emerging Trends in Mitigation	1
3	Structural Mitigation	1
4	Non-Structural Mitigation	1

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5	Programs of Disaster Mitigation in India	1
	Total	30

Course Designers

1. M. Varshana Devi – varshanadevi@ksrct.ac.in

60 PCS 2P1	**Machine Learning Techniques Laboratory**

Category	L	T	P	Credit
PC	0	0	4	2

Objective

- To apply the concepts of Machine Learning to solve real-world problems
- To implement basic algorithms in clustering & classification applied to text &numeric data
- To implement algorithms emphasizing the importance of bagging & boosting inclassification & regression
- To implement algorithms related to dimensionality reduction
- To apply machine learning algorithms for Natural Language Processingapplications

Prerequisite

Machine Learning is a mathematical discipline, and students will benefit from a good background in probability, algebra, calculus and Programming.

Course Outcomes

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

CO1	To learn to use Weka tool for implementing machine learning algorithms related tonumeric data	Remember, Understand, Analyze
CO2	To learn the application of machine learning algorithms for text data	Remember, Apply, Analyze
CO3	To use dimensionality reduction algorithms for image processing applications	Remember, Understand, Analyze
CO4	To apply CRFs in text processing applications	Remember, Understand, Apply
CO5	To use fundamental and advanced neural network algorithms for solving real-worlddata	Remember, Apply, Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2			
CO2	3	3	2			
CO3	3	3	2			
CO4	3	3	2			
CO5	3	3	2			

3 – Strong; 2 – Medium; 1 – Some

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BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS 2P1 - Machine Learning Techniques Laboratory								
M.E. Computer Science and Engineering								
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. Solving Regression & Classification using Decision Trees
2. Root Node Attribute Selection for Decision Trees using Information Gain
3. Bayesian Inference in Gene Expression Analysis
4. Pattern Recognition Application using Bayesian Inference
5. Bagging in Classification
6. Bagging, Boosting applications using Regression Trees
7. Data & Text Classification using Neural Networks
8. Using Weka tool for SVM classification for chosen domain application
9. Data & Text Clustering using K-means algorithm
10. Data & Text Clustering using Gaussian Mixture Models
11. Dimensionality Reduction Algorithms in Image Processing applications
12. Application of CRFs in Natural Language Processing

Total Hours **60**

Course Designers

1. Rajkumar S – rajkumars@ksrct.ac.in

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS 2P2	Software Engineering Laboratory

Category	L	T	P	Credit
PC	0	0	4	2

Objective

- To impart state-of-the-art knowledge on Software Engineering and UML in an interactive manner through the Web
- Present case studies to demonstrate practical applications of different concepts
- Provide a scope to students where they can solve small, real-life problems
- To apply the knowledge of different assessment method to calculate the cost of the project
- To enhance the knowledge in analysis of project progress

Prerequisite

NIL

Course Outcomes

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

CO1	Produce the requirements and use cases the client wants for the software being Produced	, Analyze
CO2	Participate in drawing up the project plan. The plan will include at least extent and work assessments of the project, the schedule, available resources, and risk management can model and specify the requirements of mid-range software and their architecture	Create
CO3	Create and specify a software design based on the requirement specification that the software can be implemented based on the design	Create
CO4	Assess the extent and costs of a project with the help of several different assessment methods	Analyze
CO5	Track the progress of the project with different analysis charts	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	1	1
CO2	3	2	2	3	1	1
CO3	3	1	3	3	3	-
CO4	3	1	3	3	3	-
CO5	3	2	2	2	2	-

3 – Strong; 2 – Medium; 1 – Some

Passed in BoS Meeting held on 20/05/23
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BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS 2P1 – Software Engineering Laboratory								
M.E. Computer Science and Engineering								
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. Write a Problem Statement to define a title of the project with bounded scope of project
2. Select relevant process model to define activities and related task set for assigned project
3. Prepare broad SRS (Software Requirement Specification) for the above selected projects
4. Prepare USE Cases and Draw Use Case Diagram using modelling Tool
5. Develop the activity diagram to represent flow from one activity to another for softwaredevelopment
6. Develop data Designs using DFD Decision Table & ER Diagram.
7. Draw class diagram, sequence diagram, Collaboration Diagram, State Transition Diagramfor the assigned project
8. Write Test Cases to Validate requirements of assigned project from SRS Document
9. Evaluate Size of the project using function point metric for the assigned project
10. Estimate cost of the project using COCOMO and COCOCMOII for the assigned project
11. Use CPM/PERT for scheduling the assigned project
12. Use timeline Charts or Gantt Charts to track progress of the assigned project

Total Hours **60**

Course Designers

1. Vadivel S – vadivel@ksrct.ac.in

60 PCS E10	Advanced Database Technology and Design	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To understand the database system concept
- To learn the concepts of relational databases and its applications
- To acquire Knowledge on distributed data bases and its applications
- To learn the concepts of object relational databases
- To understand the concept of XML databases

Prerequisite

NIL

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Course Outcomes

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

CO1	Recognize the basics of database system concepts and data models	Analyze
CO2	Examine the relational database system design	Apply
CO3	Outline the distributed databases, client server databases and parallel databases.	Analyze
CO4	Learn the object and object relational databases.	Apply
CO5	Obtain the knowledge of XML databases and data ware housing.	Apply

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6
1	3	3	3	3	3	2
2	3	3	2	3	3	2
3	3	2	2			
4	3	2	2		2	2
5	3	3	2		2	2

Assessment Pattern

Cognitive Levels	Continuous Assessment Tests			End Semester Examination(Marks)
	1	2	3	
Remember	10	20	10	10
Understand	10	20	30	20
Apply	40	20	30	40
Analyze	30	30	30	30
Evaluate	-	-	-	-
Create	-	-	-	-

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BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E10-Adavanced Database Technology and Design								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Data Base System Concept File systems - Database systems - Database systems architecture - Data models - Relational model – Hierarchical model - Network model - Entity-Relationship model - Data Dictionary - Database Administration and control	[9]
Relational Database System Design Domains and key concept - Integrity rules - Relational Algebra - Commercial query languages - Embedded SQL - Normalization and database design. File and storage structures - Indexing and Hashing - Query processing.	[9]
Distributed Databases Centralized Versus Distributed Databases – Fragmentation – Distributed database architecture – Client / Server databases – Distributed transactions – Locking and Commit protocols – Distributed concurrency Control – Security and reliability – Parallel databases	[9]
Object and Object Relational Databases Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended Relational Systems: Object Relational features in SQL/Oracle – Case Studies.	[9]
XML Databases XML Databases: XML Data Model – DTD - XML Schema - XML Querying – Web Databases – JDBC – Information Retrieval – Data mining – Data warehousing.	[9]
Total Hours	45

Text Book(s):

1. Abraham Silberschatz ,Henry F.Korth and S.Sudarshan -“Database System Concepts”, sixth Edition , McGraw-Hill, 2011.
2. Ramez Elmasri and Shamkant B.Navathe, “Fundamental Database Systems”, Fifth Edition, Pearson Education, 2009.

Reference(s):

1. SubramanianV.S., “Principles of Multimedia Database Systems”, Harcourt India Pvt Ltd., 2001.
2. Thomas Cannolly and Carolyn Begg, “Database Systems, A Practical Approach to Design, Implementation and Management”, Third Edition, Pearson Education, 2007.
3. RaghuRamakrishnan,“DatabaseManagementSystem”,TataMcGraw-HillPublishingCompany,2003.
4. Oracle Database 11g SQL and PL/SQL: A Brief Primer

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BoS Chairman

Course Contents and Lecture Schedule

S.No	Topic	No.of Hours
1	**Data Base System Concept**	
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	Relational Model	1
1.6	Hierarchical Model	1
1.7	Network Model	1
1.8	Entity Relationship Model	1
1.9	Tuple and Domain Relational Calculus	1
2	**Relational Model**	
2.1	Domain, Key concepts and integrity rules	1
2.2	Relational algebra	1
2.3	Data Definition Language	1
2.4	Data Manipulation Language – Select, Insert, Update and Delete	1
2.5	Aggregate, Group by, Order by, Sub query, Having and views	1
2.6	Embedded SQL	1
2.7	Normalization	1
2.8	File Structure	1
2.9	Indexing	1
2.10	Hashing	1
2.11	Query processing	1
3	Distributed Databases	
3.1	Centralized Versus Distributed Databases	1
3.2	Fragmentation	1
3.3	Distributed database architecture	1
3.4	Client / Server databases	1
3.5	Distributed transactions	1
3.6	Distributed Commit protocols	1
3.7	Distributed concurrency Control	1
3.8	Security and reliability	1
3.9	Parallel databases	1
4	Object and Object Relational Databases	1
4.1	Concepts for Object Databases: Object Identity, Object structure	1
4.2	Type Constructors, Encapsulation of Operations	1
4.3	Methods and Persistence	1
4.4	Type and Class Hierarchies – Inheritance	1

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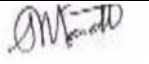

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4.5	Complex Objects	1
4.6	ODMG Model – ODL – OQL	1
4.7	Object Relational features in SQL/Oracle	1
4.8	Case Study 1	1
4.9	Case Study 2	1
5	XML Databases	
5.1	XML Data Model	1
5.2	DTD and XML Schema	1
5.3	XML Querying	1
5.4	Web Databases	1
5.5	Java Database Connectivity	1
5.6	Data Mining Concept and Applications	1
5.7	Classification Algorithms	2
5.8	Clustering Algorithms	1
5.9	Data Warehouse Concept and Preprocessing	1
5.10	Data Warehouse Schema Models	1
5.11	Designing three dimensional OLAP Cube with its operations	1
	Total	**50**

Course Designers

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

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E11	SMART SENSORS AND INTERNET OF THINGS

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- Able to understand the application areas of IOT
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- Able to understand building blocks of Internet of Things and characteristics
- Develop an application of IoT and building automation with real world design constraints
- Able to understand the building state of the art architecture in IoT

Prerequisite

NIL

Course Outcomes

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

CO1	Understand the vision of IoT from a global context	Understand
CO2	Determine the Market perspective of IoT	Apply
CO3	Reenact the use of Devices, Gateways and Data Management in IoT	Apply
CO4	Illustrate Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints	Analyse
CO5	Analyze the Building state of the art architecture in IoT	Analyse

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2		3	
CO2	3	2	2		3	
CO3	3	2	3		3	
CO4	3	2	2			
CO5	3		2			
CO6	3	2	2		3	

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	10	10	20
Apply (Ap)	20	20	30
Analyze (An)	20	20	30
Evaluate (Ev)	0	0	0
Create (Cr)	0	0	0

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E11 - SMART SENSORS AND INTERNET OF THINGS								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Environmental Parameters Measurement and Monitoring Why measurement and monitoring are important- Effects of adverse parameters for the living being for IOT	[9]
Sensors Working Principles: Different types- Selection of Sensors for Practical Applications - Introduction of Different Types of Sensors such as Capacitive, Resistive - Surface Acoustic Wave for Temperature, Pressure, Humidity, Toxic Gas.	[10]
Important Characteristics of Sensors Determination of the Characteristics - Fractional order element: Constant Phase Impedance for sensing applications such as humidity, water quality, milk quality – Impedance Spectroscopy: Equivalent circuit of Sensors and Modelling of Sensors - Importance and Adoption of Smart Sensors	[13]
Architecture of Smart Sensors Important components - their features Fabrication of Sensor and Smart Sensor: Electrode fabrication: Screen printing, Photolithography - Electroplating Sensing film deposition: Physical and chemical Vapor, Anodization, Sol-gel - Interface Electronic Circuit for Smart Sensors and Challenges for Interfacing the Smart Sensor - Usefulness of Silicon Technology in Smart Sensor And Future scope of research in smart sensor - Recent trends in smart sensor for day to day life - evolving sensors and their architecture.	[13]
Total Hours	**45**

Text book(s):

1.	Yasuura, H., Kyung, C.-M., Liu, Y., Lin, Y.-L., Smart Sensors at the IoT Frontier, Springer International Publishing.
2.	Kyung, C.-M., Yasuura, H., Liu, Y., Lin, Y.-L., Smart Sensors and Systems, Springer International Publishing.

Reference(s):

1.	Deepak Gupta, Victor Hugo C de Albuquerque, Ashish Khanna, Purnima Lala Mehta, “Smart Sensors for Industrial Internet of Things”, Springer International Publishing, First Edition, 2021.
2.	VlasiosTsiatsis Stamatis Karnouskos Jan Holler David Boyle Catherine Mulligan, “Internet of Things - Technologies and Applications for a New Age of Intelligence”, Academic Press, 2nd Edition, 2018

Course Contents and Lecture Schedule

S.No	TOPIC	No. of Hours
M1	**Environmental Parameters Measurement and Monitoring**	**-**
1.1	Effects of adverse parameters for the living being for IOT	4
1.2	Availability - Database Security and Authorization - Backup and Recovery	5
M2	**Sensors**	-
2.1	Working Principles: Different types	2
2.2	Selection of Sensors for Practical Applications	3
2.3	Introduction of Different Types of Sensors such as Capacitive, Resistive	2

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2.4	Surface Acoustic Wave for Temperature, Pressure, Humidity, Toxic Gas.	3
M3	**Important Characteristics of Sensors**	-
3.1	Determination of the Characteristics	3
3.2	Fractional order element: Constant Phase Impedance for sensing applications such as humidity, water quality, milk quality	4
3.3	Impedance Spectroscopy: Equivalent circuit of Sensors and Modelling of Sensors	4
3.4	-Importance and Adoption of Smart Sensors	2
M4	**Architecture of Smart Sensors**	-
4.1	Important components - their features Fabrication of Sensor and Smart Sensor: Electrode fabrication: Screen printing, Photolithography	2
4.2	Electroplating Sensing film deposition: Physical and chemical Vapor, Anodization, Sol-gel	3
4.3	Interface Electronic Circuit for Smart Sensors and Challenges for Interfacing the Smart Sensor	3
4.4	Usefulness of Silicon Technology in Smart Sensor and Future scope of research in smart sensor	3
4.5	Recent trends in smart sensor for day to day life	2
4.6	Evolving sensors and their architecture	
	Total	45

Course Designers

1. Mr. P. Sathishkumar – sathishkumar@ksrct.ac.in

60 PCS E12	CLOUD COMPUTING TECHNOLOGIES	Category	L	T	P	Credit
		PE	3	0	0	3

Objective
• To understand the concept of cloud and utility computing
• To understand the various issues in cloud computing
• To familiarize themselves with the lead players in cloud
• To appreciate the emergence of cloud as the next generation computing paradigm
• To be able to set up a private cloud

Prerequisite		
NIL		
Course Outcomes		
On the successful completion of the course, students will be able to		
CO1	Articulate the main concepts, key technologies, strengths and limitations of cloud computing	Understand
CO2	Identify the architecture, infrastructure and delivery models of cloud computing	Understand
CO3	Explain the core issues of cloud computing such as security,	Understand

	privacy and interoperability	
CO4	Choose the appropriate technologies, algorithms and approaches for the related issues	Analyse
CO5	Facilitate Service Level Agreements (SLA)	Analyse
Mapping with Programme Outcomes		

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	1	-	-	3	-
CO2	2	1	-	-	3	-
CO3	2	1	-	-	3	-
CO4	2	2	2	3	3	2
CO5	2	2	2	3	3	2

3 – Strong; 2 – Medium; 1 – Some

Assessment pattern

Bloom's Category	Continuous Assessment Tests (marks)		End Semester Examination (Marks)
	1	**2**	
Remember (Re)	10	10	20
Understand (Un)	30	30	60
Apply (Ap)	-	-	-
Analyse (An)	20	20	20
Evaluate (Ev)	-	-	-
Create (Cr)	-	-	-

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E12 - Cloud Computing Technologies								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

INTRODUCTION Introduction- Historical Development – Cloud Computing Architecture – The Cloud Reference Model – Cloud Characteristics –Cloud Deployment Models: Public, Private, Community, Hybrid Clouds- Cloud Delivery Models: IaaS, PaaS, SaaS – Open Source Private Cloud Software: Eucalyptus, Open Nebula, Open Stack	**[9]**
VIRTUALIZATION Data Center Technology – Virtualization – Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing –Pros and Cons of Virtualization – Implementation Levels of Virtualization – Tools and Mechanisms: Xen, VMWare, Microsoft Hyper-V, KVM, Virtual Box	**[9]**
CLOUD COMPUTING MECHANISM Cloud Infrastructure Mechanism: Cloud Storage, Cloud Usage Monitor, Resource Replication – Specialized Cloud Mechanism: Load Balancer, SLA Monitor, Pay-per-use Monitor, Audit Monitor, Failover System, Hypervisor, Resource Cluster, Multi Device Broker, State Management Database – Cloud Management Mechanism: Remote Administration System, Resource Management System, SLA Management System, Billing Management System	**[9]**
HADOOP AND MAP REDUCE Apache Hadoop – Hadoop Map Reduce –Hadoop Distributed File System- Hadoop I/O- Developing a Map Reduce Application – Map Reduce Types and Formats – Map Reduce Features– Hadoop Cluster Setup –Administering Hadoop	**[9]**
SECURITY IN THE CLOUD Basic Terms and Concepts – Threat Agents – Cloud Security Threats –Cloud Security Mechanism: Encryption, Hashing, Digital Signature, Public Key Infrastructure, Identity and Access Management, Single Sign-on, Cloud Based Security Groups, Hardened Virtual Server Images	**[9]**
Total Hours	**45**

References:

1.	Thomas Erl, Zaigham Mahood, Ricardo Puttini, “Cloud Computing, Concept, Technology & Architecture”, Prentice Hall, 2013
2.	Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, “Mastering Cloud Computing”, Tata McGraw-Hill,2013
3.	Toby Velte, Anthony Velte, Robert C. Elsenpeter, “Cloud Computing, A Practical Approach”,Tata McGraw-Hill Edition, 2010
4.	Arshdeep Bahga, Vijay Madisetti, “Cloud Computing: A Hands-On Approach”, Universities Press(India) Private Limited, 2014
5.	Tom White, “Hadoop: The Definitive Guide”, O’Reilly Media, 4th Edition, 2015
6.	James E Smith and Ravi Nair, “Virtual Machines”, Elsevier, 2005

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Course Contents and Lecture Schedule		
S.No	**Topic**	**No. of Hours**
1	**INTRODUCTION**	
1.1	Introduction	1
1.2	Historical Development	1
1.3	Cloud Computing Architecture	1
1.4	The Cloud Reference Model	1
1.5	Cloud Characteristics	1
1.6	Cloud Deployment Models: Public, Private, Community, Hybrid Clouds	1
1.7	Cloud Delivery Models: IaaS, PaaS, SaaS	1
1.8	Open Source Private Cloud Software: Eucalyptus, Open Nebula, Open Stack	2
2	**VIRTUALIZATION**	
2.1	Data Center Technology	1
2.2	Virtualization	1
2.3	Characteristics of Virtualized Environments	1
2.4	Taxonomy of Virtualization Techniques	1
2.5	Virtualization and Cloud Computing	1
2.6	Pros and Cons of Virtualization	1
2.7	Implementation Levels of Virtualization	1
2.8	Tools and Mechanisms: Xen, VMWare, Microsoft Hyper-V, KVM, Virtual Box	2
3	**CLOUD COMPUTING MECHANISM**	
3.1	Cloud Infrastructure Mechanism: Cloud Storage	1
3.2	Cloud Usage Monitor and Resource Replication	1
3.3	Specialized Cloud Mechanism: Load Balancer, SLA Monitor	1
3.4	Pay-per-use Monitor, Audit Monitorand Failover System	1
3.5	Hypervisor, Resource Cluster, Multi Device Broker and State Management Database	2
3.6	Cloud Management Mechanism: Remote Administration System, Resource Management System	2
3.7	SLA Management System and Billing Management System	1
4	**HADOOP AND MAP REDUCE**	
4.1	Apache Hadoop	1
4.2	Hadoop Map Reduce	1
4.3	Hadoop Distributed File System	1
4.4	Hadoop I/O	1
4.5	Developing a Map Reduce Application	1
4.6	Map Reduce Types and Formats	1
4.7	Map Reduce Features	1
4.8	Hadoop Cluster Setup	1
4.9	Administering Hadoop	1
5	**SECURITY IN THE CLOUD**	
5.1	Basic Terms and Concepts	1
5.2	Threat Agents	1
5.3	Cloud Security Threats	1
5.4	Cloud Security Mechanism: Encryption	1
5.5	Hashing, Digital Signature	1
5.6	Public Key Infrastructure	1
5.7	Identity and Access Management	1
5.8	Single Sign-on, Cloud Based Security Groups	1
5.9	Hardened Virtual Server Images	1
	Total	**45**

Course Designers

1. Ms.B.JANANI – janani@ksrct.ac.in

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E13	INFORMATION RETRIEVAL TECHNIQUES

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To understand the basic concepts of information retrieval modeling.
- To understand effective use of the different kind of queries normally posed to text retrieval systems.
- To learn and understand the various text operations and user interface.
- To learn and understand fast searching methods that will search a database of multimedia objects.
- To learn and understand the different forms of web search and digital libraries.

Prerequisite

NIL

Course Outcomes

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

CO1	Interpret the Information Retrieval system is the issue of predicting which document are relevant or which are not.	Remember, Understand, Apply Analyze
CO2	Apply the system performance and retrieval performance evaluation for finding the relevant document.	Remember, Understand, Apply Analyze
CO3	Analyze and Identify the better result of search process from information sources.	Remember, Understand, Apply Analyze
CO4	Analyze and interpret the fast searching methods that will search a database of multimedia objects that match a query object.	Remember, Understand, Apply Analyze
CO5	Apprehend the different forms of web search and digital libraries.	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	3	2	3
CO2	3	2	3	3	2	3
CO3	3	2	3	3	2	3
CO4	3	2	3	3	2	3
CO5	3	2	3	3	2	3

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	10	10	20
Apply (Ap)	20	20	30
Analyze (An)	20	20	30
Evaluate (Ev)	0	0	0
Create (Cr)	0	0	0

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E13 - INFORMATION RETRIEVAL TECHNIQUES								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

INTRODUCTION Basic Concepts – Retrieval Process – Modeling – Classic Information Retrieval – Set Theoretic, Algebraic and Probabilistic Models – Structured Text Retrieval Models – Retrieval Evaluation – Word Sense Disambiguation.	**[9]**
QUERYING Languages – Key Word Based Querying – Pattern Matching – Structural Queries – Query Operations –User Relevance Feedback – Local and Global Analysis – Text and Multimedia Languages.	**[9]**
TEXT OPERATIONS AND USER INTERFACE Document Preprocessing – Clustering – Text Compression - Indexing and Searching – Inverted files – Boolean Queries – Sequential searching – Pattern matching – User Interface and Visualization – Human Computer Interaction – Access Process – Starting Points – Query Specification - Context – User relevance Judgment – Interface for Search.	**[9]**
MULTIMEDIA INFORMATION RETRIEVAL Data Models – Query Languages – Spatial Access Models – Generic Approach – One Dimensional Time Series – Two Dimensional Color Images – Feature Extraction.	**[9]**
APPLICATIONS Searching the Web – Challenges – Characterizing the Web – Search Engines – Browsing – Meta Searchers – Online IR Systems – Online Public Access Catalogs – Digital Libraries – Architectural Issues – Document Models, Representations and Access – Prototypes and Standards.	**[9]**
Total Hours	**45**

Text Book(s):

1.	Ricardo Baeza-Yate and Berthier Ribiero-Neto, “Modern Information Retrieval”, Pearson Education Asia, 2011.
2.	G. Chowdhury, “Introduction to Modern Information Retrieval”, Neal-Schuman Publishers; Third Edition, 2010.

Reference(s):

1.	David A. Grossman, Ophir Frieder, “Information Retrieval: Algorithms, and Heuristics”, Academic Press, 2004.
2.	Charles T. Meadow, Bert R. Boyce, Donald H. Kraft, “Text Information Retrieval Systems”, Academic Press, 2006.
3.	Gerald J Kowalski, Mark T Maybury Information Storage and Retrieval Systems: Theory and Implementation, Springer, 2004.
4.	David A. Grossman, Ophir Frieder, Information Retrieval – Algorithms and Heuristics, Springer, 2nd Edition(Distributed by Universal Press), 2004.
5.	Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, —Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**INTRODUCTION**	
1.1	Basic Concepts, Retrieval Process	1

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1.2	Modeling, Classic Information Retrieval	1
1.3	Set Theoretic,Algebraic and Probabilistic Models	2
1.4	Structured Text Retrieval Models	2
1.5	Retrieval Evaluation	2
1.6	Word Sense Disambiguation	1
2	**QUERYING**	
2.1	Languages, Key Word Based Querying	2
2.2	Pattern Matching	1
2.3	Structural Queries	2
2.4	Query Operations, User Relevance Feedback	1
2.5	Local and Global Analysis	2
2.6	Text and Multimedia Languages	1
3	**TEXT OPERATIONS AND USER INTERFACE**	
3.1	Document Pre-processing	1
3.2	Clustering, Text Compression	2
3.3	Indexing and Searching, Inverted files, Boolean Queries	1
3.4	Sequential Searching, Pattern matching	1
3.5	User Interface and Visualization	1
3.6	Human Computer Interaction, Access Process, Starting Points	1
3.7	Query Specification, Context	1
3.8	UserRelevance Judgment, Interface for Search	1
4	**MULTIMEDIA INFORMATION RETRIEVAL**	
4.1	Data Models	1
4.2	Query Languages	1
4.3	Spatial Access Models	2
4.4	Generic Approach - One DimensionalTime Series	2
4.5	Generic Approach - Two Dimensional Color Images	2
4.6	Feature Extraction	1
5	**APPLICATIONS**	
5.1	Searching the Web, Challenges	1
5.2	Characterizing the Web, Search Engines	2
5.3	Browsing, Meta-Searchers	1
5.4	Online IR Systems	1
5.5	Online Public Access Catalogs, Digital Libraries	1
5.6	ArchitecturalIssues, Document Models	2
5.7	Representations and Access, Prototypes and Standards	1
	Total	45

Course Designers

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Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E19	DEEP LEARNING

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To understand the basic ideas and principles of Neural Networks
- To understand the basic concepts of Big Data and Data Analysis
- To familiarize the student with The Image Processing facilities like Tensorflow and Keras
- To analyse Different Deep Learning Models for different Applications
- To understand and implement Deep Learning Architectures

Prerequisite

Machine Learning Techniques

Course Outcomes

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

CO1	Understand the building blocks of Deep learning	Remember, Understand
CO2	Implement Feature extraction and feature learning by using TensorFlow/ Keras in Deep Learning Applications	Understand, Apply
CO3	Design and implement image recognition and image classification using a pretrained network Learning	Understand, Apply, Analyze
CO4	Analyse Different Deep Learning Models in Image Related Projects	Understand, Analyze
CO5	Design and implement case studies using Convolutional Neural Networks	Understand, Apply, Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	2			2
CO2	3	3	3	2	3	
CO3	3	3	3	2	3	2
CO4	3	3	3	2	2	2
CO5	3	3	3	2	3	

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	10	10	20
Apply (Ap)	20	20	30
Analyze (An)	20	20	30
Evaluate (Ev)	0	0	0
Create (Cr)	0	0	0

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E19 Deep Learning								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

BASICS OF NEURAL NETWORKS Basic concept of Neurons – role of Neural Networks - Building Blocks of Neural Network - Optimizers. Activation Functions. Loss Functions. Perceptron Algorithm – Boltzmann Machine and Perceptron - Data Pre-processing for neural networks- Feature extraction and feature learning.	**[7]**
INTRODUCTION TO DEEP LEARNING Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization – Dropout - Installation of TensorFlow and Keras. Overfitting and Underfitting. Hyper parameters.	**[8]**
CONVOLUTIONAL NEURAL NETWORKS Role of Convolutional Networks in Machine Learning.- CNN Architectures – Concept of Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning - Image classification and recurrent nets.	**[9]**
MORE DEEP LEARNING ARCHITECTURES LSTM, GRU, Encoder/Decoder Architectures – Auto encoders – Compression of features using Auto encoders.- Standard- Sparse – Denoising – Contractive- Variational Auto encoders – Adversarial Generative Networks – Auto encoder and DBM - deep generative models, Deep Belief Networks.	**[9]**
APPLICATIONS OF DEEP LEARNING Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs. **PRACTICAL EXERCISES:** 1. Implement Simple Programs like vector addition in TensorFlow. 2. Implement a simple problem like regression model in Keras. 3. Implement a Feed-Forward Network in TensorFlow/Keras. 4. Implement Feature Selection from Video and Image Data 5. Implement an Image Classifier using CNN in TensorFlow/Keras. 6. Implement a Simple LSTM using TensorFlow/Keras.	**[12]**
Total Hours	**45**

Text book(s):	
1.	Ian Good Fellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2017.
2.	Francois Chollet, “Deep Learning with Python”, Manning Publications, 2018.
3	Phil Kim, “Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence”, Apress , 2017.
4	Deep Learning A Practitioner’s Approach Josh Patterson and Adam Gibson O’Reilly Media, Inc. 2017
Reference(s):	
1.	Ian Good Fellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2017.
2.	Francois Chollet, “Deep Learning with Python”, Manning Publications, 2018.
3.	Phil Kim, “Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence”,Apress , 2017.

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4.	Ragav Venkatesan, Baoxin Li, “Convolutional Neural Networks in Visual Computing”, CRC Press, 2018.
5.	Navin Kumar Manaswi, “Deep Learning with Applications Using Python”, Apress, 2018.
6	Joshua F. Wiley, “R Deep Learning Essentials”, Packt Publications, 2016.

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**BASICS OF NEURAL NETWORKS**	
1.1	Basic concept of Neurons - Building Blocks of Neural Network	1
1.2	Optimizers	1
1.3	Activation Functions , Loss Functions.	1
1.4	Perceptron Algorithm	1
1.5	Boltzmann Machine and Perceptron	1
1.6	Data Pre-processing for neural networks	1
1.7	Feature extraction and feature learning.	1
2	**INTRODUCTION TO DEEP LEARNING**	
2.1	Feed Forward Neural Networks	1
2.2	Gradient Descent	1
2.3	Back Propagation Algorithm	1
2.4	Vanishing Gradient problem – Mitigation	1
2.5	RelU Heuristics for Avoiding Bad Local Minima	1
2.6	Gradient Descent – Regularization – Dropout	1
2.7	Installation of TensorFlow and Keras.	1
2.8	Overfitting and Underfitting. Hyperparameters.	1
3	**CONVOLUTIONAL NEURAL NETWORKS**	
3.1	Role of Convolutional Networks in Machine Learning	1
3.2	CNN Architectures	1
3.3	Concept of Convolution	1
3.4	Pooling Layers	1
3.5	Transfer Learning	1
3.6	Image Classification using Transfer Learning	2
3.7	Image classification and recurrent nets	1
3.8	Image and video recognition	1
4	**MORE DEEP LEARNING ARCHITECTURES**	
4.1	LSTM	1

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4.2	GRU	1
4.3	Encoder/Decoder Architectures, Auto encoders	1
4.4	Compression of features using Auto encoders	1
4.5	Standard- Sparse – Denoising	1
4.6	Contractive- Variational Auto encoders	1
4.7	Adversarial Generative Networks	1
4.8	Deep generative models,	1
4.9	Deep Belief Networks.	1
5	**APPLICATIONS OF DEEP LEARNING**	
5.1	Image Segmentation – Object Detection	1
5.2	Automatic Image Captioning	1
5.3	Image generation with Generative Adversarial Networks	1
5.4	Video to Text with LSTM Models	2
5.5	Attention Models for Computer Vision	1
5.6	Case Study: Named Entity Recognition	1
5.7	Opinion Mining using Recurrent Neural Networks	2
5.8	Parsing and Sentiment Analysis using Recursive Neural Networks	1
5.9	Sentence Classification using Convolutional Neural Networks	1
5.10	Dialogue Generation with LSTMs.	2
	Total	45

Course Designers

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Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E21	DATA WAREHOUSING AND DATA MINING

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To understand the concept of data mining and data warehousing
- To learn the classification and prediction techniques in data mining
- To study the mining of time series data
- To know the methodologies for stream data processing and stream data systems
- To analyse the techniques for web mining

Prerequisite

NIL

Course Outcomes

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

CO1	Understand the concept of data warehousing and mining techniques	Remember, Understand, Apply Analyze
CO2	Gain knowledge on different clustering methods	Remember, Understand, Apply Analyze
CO3	Perform analytics on Time series Data and extracting knowledge	Remember, Understand, Apply Analyze
CO4	Illustrate pattern mining in stream data and Analysis of Social Network Data	Remember, Understand, Apply Analyze
CO5	Explain the extracting of information from the web data and types of web mining	Remember, Understand, Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	3	2	3
CO2	3	2	3	3	2	3
CO3	3	2	3	3	2	3
CO4	3	2	3	3	2	3
CO5	3	2	3	3	2	3

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	10	10	20
Apply (Ap)	20	20	30
Analyze (An)	20	20	30
Evaluate (Ev)	0	0	0
Create (Cr)	0	0	0

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BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E21 - Data Warehousing and Data Mining								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Introduction to Data Warehousing Data Mining: Mining frequent patterns, association and correlations; Sequential Pattern Mining concepts, primitives, scalable methods.	**[9]**
Classification and Prediction Cluster Analysis – Types of Data in Cluster Analysis, Partitioning methods, Hierarchical Methods; Transactional Patterns and other temporal based frequent patterns.	**[9]**
Mining Time Series Data Periodicity Analysis for time related sequence data, Trend analysis, Similarity search in Time-series analysis	**[9]**
Mining Data Streams Methodologies for stream data processing and stream data systems, Frequent pattern mining in stream data, Sequential Pattern Mining in Data Streams, Classification of dynamic data streams, Class Imbalance Problem; Graph Mining; Social Network Analysis.	**[9]**
Web Mining Mining the web page layout structure, mining web link structure, mining multimedia data on the web, Automatic classification of web documents and web usage mining; Distributed Data Mining. **Recent Trends** Recent trends in Distributed Warehousing and Data Mining, Class Imbalance Problem; Graph Mining; Social Network Analysis.	**[9]**
Total Hours	**45**

Text Book(s):	
1.	Jiawei Han and M Kamber, Data Mining Concepts and Techniques,, Second Edition, Elsevier Publication, 2011.
2.	Mathew A. Russell, Mikhail Klassen, “Mining The Social Web: Data Mining Facebbok, Twitter, Linkedin, Instagram, Github and More, Third Edition, O’Reilly.
Reference(s):	
1.	Vipin Kumar, Introduction to Data Mining - Pang-Ning Tan, Michael Steinbach, Addison Wesley, 2006.
2.	Adriaan, “Introduction to Data Mining”, Addison Wesley Publication
3.	A.K.Pujari, “Data Mining Techniques”, University Press
4.	G Dong and J Pei, Sequence Data Mining, Springer, 2007.

Course Contents and Lecture Schedule

S.No.	Topic	No.of Hours
1	**Introduction to Data Warehousing**	
1.1	Data Mining: Mining frequent patterns	1
1.2	Association and correlations	2
1.3	Sequential Pattern Mining concepts	2
1.4	primitives	2

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1.5	scalable methods	2
2	**Classification and Prediction**	
2.1	Cluster Analysis	1
2.2	Types of Data in Cluster Analysis	2
2.3	Partitioning methods	2
2.4	Hierarchical Methods	2
2.5	Transactional Patterns and other temporal based frequent patterns	2
3	**Mining Time Series Data**	
3.1	Periodicity Analysis for time related sequence data	2
3.2	Trend analysis	2
3.3	Similarity search in Time-series analysis	2
3.4	Sequential Pattern Mining in Data Streams	2
4	**Mining Data Streams**	
4.1	Methodologies for stream data processing and stream data systems	2
4.2	Frequent pattern mining in stream data	2
4.3	Classification of dynamic data streams	2
4.4	Class Imbalance Problem	1
4.5	Graph Mining	2
4.6	Social Network Analysis	1
5	**Web Mining**	
5.1	Mining the web page layout structure	1
5.2	mining web link structure	1
5.3	mining multimedia data on the web	2
5.4	Automatic classification of web documents and web usage mining	2
5.5	Distributed Data Mining.	2
5.6	Recent trends in Distributed Warehousing and Data Mining	1
	Total	**45**

Course Designers

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

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E23	Cryptocurrency and Blockchain Technologies	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- This course is intended to study the basics of Blockchain technology.
- During this course the learner will explore various aspects of Blockchain technology like application in various domains.
- By implementing, learners will have idea about private and public Blockchain, and smart contract.

Prerequisite

Nil

Course Outcomes

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

CO1	Understand and explore the working of Blockchain technology	Understand
CO2	Analyze the working of Smart Contracts	Analyze
CO3	Understand and analyze the working of Hyperledger	Analyze
CO4	Apply the learning of solidity to build de-centralized apps on Ethereum	Apply
CO5	Develop applications on Blockchain	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	1	3	2	2	3
CO2	2	1	2	3	2	2
CO3	2	1	3	1	2	1
CO4	2	1	2	3	2	2
CO5	1	1	2	3	3	3

Assessment Pattern

Bloom'sCategory	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	10	10	20
Apply (Ap)	20	20	30
Analyze (An)	20	20	30
Evaluate (Ev)	0	0	0
Create (Cr)	0	0	0

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BoS Chairman

K.S.RANGASAMY COLLEGE OF TECHNOLOGY – AUTONOMOUS R2022								
60 PCS E23 – CRYPTOCURRENCY AND BLOCKCHAIN TECHNOLOGIES								
M.E. Computer Science and Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

INTRODUCTION OF CRYPTOGRAPHY AND BLOCKCHAIN What is Blockchain - Blockchain Technology Mechanisms & Networks - Blockchain Origins - Objective of Blockchain - Blockchain Challenges - Transactions and Blocks - P2P System -, Keys as Identity - Digital Signatures - Hashing, and public key cryptosystems - private vs. public Blockchain.	[9]
BITCOIN AND CRYPTOCURRENCY What is Bitcoin - The Bitcoin Network - The Bitcoin Mining Process - Mining Developments - Bitcoin Wallets - Decentralization and Hard Forks - Ethereum Virtual Machine (EVM) - Merkle Tree - Double- Spend Problem - Blockchain and Digital Currency - Transactional Blocks - Impact of Blockchain Technology on Cryptocurrency.	[9]
INTRODUCTION TO ETHEREUM What is Ethereum - Introduction to Ethereum - Consensus Mechanisms - Metamask Setup, Ethereum Accounts, Transactions, Receiving Ethers, Smart Contracts.	[9]
INTRODUCTION TO HYPERLEDGER AND SOLIDITY PROGRAMMING What is Hyperledger - Distributed Ledger Technology & its Challenges - Hyperledger & Distributed Ledger Technology - Hyperledger Fabric - Hyperledger Composer. Solidity - Language of Smart Contracts, Installing Solidity & Ethereum Walle -, Basics of Solidity - Layout of a Solidity Source File & Structure of Smart Contracts, General Value Types.	[9]
BLOCKCHAIN APPLICATIONS Internet of Things - Medical Record Management System - Domain Name Service and Future of Blockchain - Alt Coins	[9]
Total Hours	**45**

Text book(s)	
1.	Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained”, Second Edition, Packt Publishing, 2018.
2.	Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction” Princeton University Press, 2016
Reference(s):	
1.	Antonopoulos, Mastering Bitcoin, O’Reilly Publishing, 2014.
2.	Antonopoulos and G. Wood, “Mastering Ethereum: Building Smart Contracts and Dapps”, O’Reilly Publishing, 2018.
3.	D. Drescher, Blockchain Basics. Apress, 2017.

Course Contents and Lecture Schedule

S.No.	Topic	No.of Hours
1	**Introduction of Cryptography and Blockchain**	
1.1	What is Blockchain	1
1.2	Blockchain Technology Mechanisms & Networks	1
1.3	Blockchain Origins	1
1.4	Objective of Blockchain	1
1.5	Blockchain Challenges	1
1.6	Transactions and Blocks	1
1.7	P2P System Keys as Identity	1
1.8	Digital Signatures - Hashing, and public key cryptosystems	1

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1.9	Private vs. public Blockchain	1
2	**Bitcoin and Cryptocurrency**	
2.1	What is Bitcoin & The Bitcoin Network	1
2.2	The Bitcoin Mining Process	1
2.3	Mining Developments	1
2.4	Bitcoin Wallets	1
2.5	Decentralization and Hard Forks	1
2.6	Ethereum Virtual Machine (EVM)	1
2.7	Merkle Tree - Double- Spend Problem	1
2.8	Blockchain and Digital Currency	1
2.9	Impact of Blockchain Technology on Cryptocurrency.	1
3	**Introduction To Ethereum**	
3.1	What is Ethereum	1
3.2	Introduction to Ethereum	1
3.3	Consensus Mechanisms	1
3.4	Metamask Setup	1
3.5	Ethereum Accounts	1
3.6	Transactions,	1
3.7	Receiving Ethers	1
3.8	Smart Contracts	2
4	**Introduction To Hyper ledger And Solidity Programming**	
4.1	What is Hyper ledger	1
4.2	Distributed Ledger Technology & its Challenges	1
4.3	Hyper ledger & Distributed Ledger Technology	1
4.4	Hyper ledger Fabric	1
4.5	Hyperledger Composer	1
4.6	Solidity - Language of Smart Contracts	1
4.7	Installing Solidity & Ethereum Wallet - Basics of Solidity	1
4.8	Layout of a Solidity Source File & Structure of Smart Contracts	1
4.9	General Value Types	1
5	**Blockchain Applications**	
5.1	Internet of Things	2
5.2	Medical Record Management System	2
5.3	Domain Name Service	2
5.4	Future of Blockchain	1
5.5	Alt Coins	2
	Total	**45**

Course Designers

1. Dr.K.Prasanth – prasanth@ksrct.ac.in

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E25	Web Data Mining	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- Introduces basic concepts, tasks, methods, and techniques in web mining
- Develop an understanding of the web mining process and issues, learn various techniques for data mining
- Learn the techniques in solving data mining problems using tools
- Know the classification and prediction techniques for web mining
- Understand the techniques in solving data mining problems using data mining tools and systems.

Prerequisite

NIL

Course Outcomes

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

CO1	Gain the knowledge of basic concepts data mining and its functionalities	Remember, Understand
CO2	Familiar with data mining and knowledge discovery process	Understand, Apply
CO3	Learn various techniques for web usage mining process and techniques	Understand, Apply
CO4	Learn classification and prediction algorithms for web data mining	Understand, Apply
CO5	Apply the techniques in solving data mining problems using data mining tools and systems	Apply

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6
1	3	3	3	3	3	2
2	3	3	2	3	3	2
3	3	2	2			
4	3	2	2		2	2
5	3	3	2		2	2

Assessment Pattern

Cognitive Levels	Continuous Assessment Tests			End Semester Examination(Marks)
	1	2	3	
Remember	10	-	10	10
Understand	10	40	30	50
Apply	40	20	20	40
Analyze				-
Evaluate	-	-	-	-
Create	-	-	-	-

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BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E25-Web Data Mining								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Introduction What is Data Mining - Relational Databases - Data Warehouses - Transactional Databases - Advanced Database Systems - Data Mining Functionalities - Interestingness of a pattern Classification of Data Mining Systems - Major issues in Data Mining	[9]
Data Mining and Knowledge Discovery The KDD process and methodology - Data preparation for knowledge discovery - Overview of data mining techniques - Market basket analysis - Classification and prediction – Clustering - Memory-based reasoning - Evaluation and Interpretation.	[9]
Web Usage Mining Process and Techniques Data collection and sources of data- Data preparation for usage mining - Mining navigational patterns - Integrating e-commerce data - Leveraging site content and structure - User tracking and profiling - E-Metrics: measuring success in e-commerce Privacy issues.	[9]
Classification and Prediction Concepts and Issues regarding Classification and Prediction – Classification by Decision Tree Induction – Bayesian Classification - Classification by Back-propagation - Classification Based on Concepts from Association Rule Mining.	[9]
Web Mining Applications and Other Topics Data integration for e-commerce - Web personalization and recommender systems - Web content and structure mining - Web data warehousing - Review of tools, applications, and systems.	[9]
Total Hours	45

Text Book(s):

1.	Michael Berry and Gordon Linoff, “Data Mining Techniques for Marketing, Sales, and Customer Relationship Management”, Second Edition, John Wiley, 2004
2.	Ralph Kimball and Richard Merz, “The Data Web house Toolkit”, John Wiley, 2000

Reference(s):

1.	Bing Liu, “Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data”, Springer; 1st ed. 2007. Corr. 2nd printing edition (30 May 2007)
2.	Ian Witten and Eibe Frank, “Data Mining: Practical Machine Learning Tools and Techniques”, 3rd Ed., Morgan Kaufmann, 2011
3.	Christopher D. Manning, Prabhakar Raghavan and Hinrich Schutze, “Introduction to Information Retrieval”, Cambridge University Press. 2008.
4.	Gordon Linoff and Michael Berry, “Mining the Web: Transforming Customer Data into Customer Value” John Wiley & Sons, 2001.

Course Contents and Lecture Schedule

Module No.	Topic	No. of Hours
1	**Introduction**	
1.1	Data Mining - Introduction	1
1.2	Relational Databases	1
1.3	Data Warehouses	1

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1.4	Transactional Databases	1
1.5	Advanced Database Systems	1
1.6	Data Mining Functionalities	1
1.7	Interestingness of a pattern Classification of Data Mining Systems	2
1.8	Major issues in Data Mining	1
2	**Data Mining and Knowledge Discovery**	
2.1	The KDD process and methodology	1
2.2	Data preparation for knowledge discovery	1
2.3	Overview of data mining techniques	1
2.4	Market basket analysis	1
2.5	Classification and prediction	1
2.6	Clustering	1
2.7	Memory-based reasoning	1
2.8	Evaluation and Interpretation	2
3	**Web Usage Mining Process and Techniques**	
3.1	Data collection and sources of data	1
3.2	Data preparation for usage mining	1
3.3	Mining navigational patterns	1
3.4	Integrating e-commerce data	1
3.5	Leveraging site content and structure	2
3.6	User tracking and profiling	2
3.7	E-Metrics: measuring success in e-commerce Privacy issues.	1
4	**Classification and Prediction**	
4.1	Concepts and Issues regarding Classification and Prediction	1
4.2	Classification by Decision Tree Induction	2
4.3	Bayesian Classification	2
	Classification by Back-propagation	2
	Classification Based on Concepts from Association Rule Mining	2
5	**Web Mining Applications and Other Topics**	
5.1	Data integration for e-commerce	1
5.2	Web personalization and recommender systems	2
5.3	Web content and structure mining	2
5.4	Web data warehousing	2
5.5	Review of tools, applications, and systems	2
	Total Hours	**45**

Course Designers

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

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E28	CYBER SECURITY	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To learn the cyber security needs of an organization
- To know the hackers and cyber crimes
- To understand the ethical hacking and social engineering systems
- To learn cyber forensics and various cyber security auditing
- To study the cyber ethics and laws

Prerequisite

NIL

Course Outcomes

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

CO1	Comprehend the cyber security needs of an organization	Remember
CO2	Discover the hackers and cybercrimes types	Understand
CO3	Recognize the ethical hacking and social engineering systems	Apply
CO4	Gain the knowledge on cyber forensics and various cyber security auditings	Remember
CO5	Identify the cyber ethics and laws	Remember

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3			
CO2	3	3	3			
CO3	3	3	3			
CO4	3	3	3			
CO5	3	3	3			

Assessment Pattern

Cognitive Levels	Continuous Assessment Tests		End Semester Examination(Marks)
	1	2	
Remember	15	15	30
Understand	20	15	30
Apply	15	20	20
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-

Passed in BoS Meeting held on 20/05/23
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K.S.Rangasamy College of Technology–Autonomous R2022								
60 PCS E28-CYBER SECURITY								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

INTRODUCTION TO CYBER SECURITY Introduction to Cyber Security - Importance and challenges in Cyber Security - Cyberspace – Cyber threats - Cyber warfare - CIA Triad - Cyber Terrorism - Cyber Security of Critical Infrastructure - Cyber security -Organizational Implications.	[7]
HACKERS AND CYBER CRIMES Types of Hackers - Hackers and Crackers - Cyber-Attacks and Vulnerabilities - Malware threats - Sniffing - Gaining Access - Escalating Privileges - Executing Applications - Hiding Files – Covering Tracks - Worms - Trojans - Viruses - Backdoors	[12]
ETHICAL HACKING AND SOCIAL ENGINEERING Ethical Hacking Concepts and Scopes - Threats and Attack Vectors - Information Assurance – Threat Modeling - Enterprise Information Security Architecture - Vulnerability Assessment and Penetration Testing - Types of Social Engineering - Insider Attack - Preventing Insider Threats – Social Engineering Targets and Defence Strategies.	[10]
CYBER FORENSICS AND AUDITING Introduction to Cyber Forensics - Computer Equipment and associated storage media - Role of forensics Investigator - Forensics Investigation Process - Collecting Network based Evidence - Writing Computer Forensics Reports - Auditing - Plan an audit against a set of audit criteria - Information Security Management System Management. Introduction to ISO 27001:2013.	[10]
CYBER ETHICS AND LAWS Introduction to Cyber Laws - E-Commerce and E-Governance - Certifying Authority and Controller - Offences under IT Act- Computer Offences and its penalty under IT Act 2000 - Intellectual Property Rights in Cyberspace.	[6]
Total Hours	45

Text Book(s):

1.	Donaldson, S., Siegel, S., Williams, C.K., Aslam, A., "Enterprise Cyber security -How to Build a Successful Cyber defense Program against Advanced Threats", Apress, 1st Edition, 2015.

Reference(s):

1.	Nina Godbole, Sumit Belapure, "Cyber Security", Willey, 2011.
2.	Roger Grimes, " Hacking the Hacker" , Wiley, ist Edition, 2017.
3.	Cyber Law By Bare Act, Govt of India, It Act 2000.

Course Contents and Lecture Schedule

Module No.	Topic	No. of Hours
1	**INTRODUCTION TO CYBER SECURITY**	
1.1	Introduction to Cyber Security	1
1.2	Importance and challenges in Cyber Security	1
1.3	Cyberspace ,Cyber threats, Cyber warfare	2
1.4	CIA Triad, Cyber Terrorism	1
1.5	Cyber Security of Critical Infrastructure, Cyber security ,Organizational Implications.	2
2	**HACKERS AND CYBER CRIMES**	
2.1	Types of Hackers - Hackers and Crackers	1
2.2	Cyber-Attacks and Vulnerabilities, Malware threats	2

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2.3	Sniffing , Gaining Access, Escalating Privileges	2
2.4	Executing Applications, Hiding Files	2
2.5	Covering Tracks	2
2.6	Worms, Trojans	2
2.7	Viruses, Backdoors	1
3	**ETHICAL HACKING AND SOCIAL ENGINEERING**	
3.1	Ethical Hacking Concepts and Scopes	1
3.2	Threats and Attack Vectors	1
3.3	Information Assurance	1
3.4	Threat Modeling	1
3.5	Enterprise Information Security Architecture	2
3.6	Vulnerability Assessment and Penetration Testing, Types of Social Engineering	2
3.7	Insider Attack, Preventing Insider Threats	1
3.8	Social Engineering Targets and Defence Strategies	1
4	**CYBER FORENSICS AND AUDITING**	
4.1	Introduction to Cyber Forensic, Computer	1
4.2	Role of forensics Investigator	1
4.3	Equipment and associated storage media	1
4.4	Forensics Investigation Process	2
4.5	Collecting Network based Evidence, Writing Computer Forensics Reports	2
4.6	Auditing, Plan an audit against a set of audit criteria	2
4.7	Information Security Management System Management, Introduction to ISO 27001:2013.	1
5	**CYBER ETHICS AND LAWS**	
5.1	Introduction to Cyber Laws	1
5.2	Commerce and E-Governance	1
5.3	ECertifying Authority and Controller	1
5.4	Offences under IT Act	1
5.5	Computer Offences and its penalty under IT Act 2000	1
5.6	Intellectual Property Rights in Cyberspace.	1
	Total Hours	**45**

Course Designers

1.Mr.R.VIJAY SAI - vijaysair@ksrct.ac.in

		Category	L	T	P	Credit
60 PCS E29	**SOFT COMPUTING**	PE	3	0	0	3

Objective

- To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario
- To implement soft computing based solutions for real-world problems
- To introduce the fuzzy systems, fuzzy logic, genetic algorithms and its applications.
- To give students knowledge of non-traditional technologies and fundamentals of artificial neural networks.
- To provide student a hand-on experience on MATLAB to implement various strategies

Prerequisite

NIL

Course Outcomes

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

CO1	Identify and describe soft computing techniques and their roles in building intelligent machines	Remember Understand
CO2	Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems	Apply
CO3	Apply genetic algorithms to combinatorial optimization problems	Apply
CO4	Evaluate and compare solutions by various soft computing approaches for a given problem	Analyze
CO5	Apply the knowledge of soft computing techniques in artificial neural networks and fuzzy logic	Apply

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3		2	2
CO2	3	3	3		3	3
CO3	3	2	3		3	2
CO4	3	3	3		2	2
CO5	3	3	3		3	3

Assessment Pattern

Cognitive Levels	Continuous Assessment Tests		End Semester Examination(Marks)
	1	2	
Remember	15	15	30
Understand	20	15	30
Apply	15	20	20
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-

Passed in BoS Meeting held on 20/05/23
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BoS Chairman

K.S.Rangasamy College of Technology–Autonomous R 2022								
60 PCS E29 – Soft Computing								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	C	E	Total
II	3	0	0	45	3	40	60	100

Introduction to Soft Computing and Neural Networks Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics	[8]
Fuzzy Logic Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.	[9]
Neural Networks Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks	[10]
Genetic Algorithms Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning: Machine Learning Approach to Knowledge Acquisition.	[8]
Matlab/Python Lib Introduction to Matlab/Python, Arrays and array operations, Functions and Files, Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic **Recent Trends** Recent Trands in deep learning, various classifiers, neural networks and genetic algorithm. Implementation of recently proposed soft computing techniques.	[10]
Total Hours	45

Reference(s):

1.	Jyh:Shing Roger Jang, Chuen:Tsai Sun, EijiMizutani, “Neuro:Fuzzy and Soft Computing”, Prentice:Hall of India, 2003
2.	George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic:Theory and Applications”, Prentice Hall, 1995.
3.	D. K. Pratihar, “Soft Computing: Fundamentals and Applications”, Alpha Science International Ltd, 2013.
4.	Samir Roy, Udit Chakraborty, “Introduction to Soft Computing - Neuro – Fuzzy and Genetic Algorithms”, First Edition, Pearson.
5.	N.P. Padhy, S.P. Simon, “Soft Computing with MATLAB Programming”, First Edition, Oxford Higher Education, 2015.
6.	MATLAB Toolkit Manual.

Course Contents and Lecture Schedule

Module No.	Topic	No. of Hours
1	**Introduction to Soft Computing and Neural Networks**	
1.1	Evolution of Computing	2
1.2	Soft Computing Constituents	2
1.3	From Conventional AI to Computational Intelligence	2

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1.4	Machine Learning Basics	2
2	**Fuzzy Logic**	
2.1	Fuzzy Sets	1
2.2	Operations on Fuzzy Sets	1
2.3	Fuzzy Relations	2
2.4	Membership Functions	1
2.5	Fuzzy Rules and Fuzzy Reasoning	1
2.6	Fuzzy Inference Systems	1
2.7	Fuzzy Expert Systems	1
2.8	Fuzzy Decision Making	1
3	**Neural Networks**	
3.1	Machine Learning Using Neural Network	1
3.2	Adaptive Networks	1
3.3	Feed forward Networks	1
3.4	Supervised Learning Neural Networks	1
3.5	Radial Basis Function Networks	2
3.6	Reinforcement Learning	2
3.7	Unsupervised Learning Neural Networks	1
3.8	Adaptive Resonance architectures	1
3.9	Advances in Neural networks	
4	**Genetic Algorithms**	
4.1	Introduction to Genetic Algorithms (GA)	2
4.2	Applications of GA in Machine Learning	3
4.3	Machine Learning Approach to Knowledge Acquisition	3
5	**Matlab/Python Lib**	
5.1	Introduction to Matlab/Python	1
5.2	Arrays and array operations	1
5.3	Functions and Files	2
5.4	Study of neural network toolbox	2
5.5	fuzzy logic toolbox	1
5.6	Simple implementation of Artificial Neural Network and Fuzzy Logic	3
	Total Hours	**45**

Course Designers

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Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E30	SOCIAL NETWORK ANALYSIS

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To understand the components of the social network
- To model and visualize the social network
- To mine the users in the social network
- To understand the evolution of the social network
- To mine the interest of the user

Prerequisite

Graph Theory, Machine Learning Techniques

Course Outcomes

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

CO1	Explore Social network data and social relations	Remember, Understand
CO2	Model and visualize the social network	Understand, Apply
CO3	Mine the behaviour of the users in social web and related communities	Understand, Apply, Analyze
CO4	Analyze Social Influence of users and Predict the possible next outcome in the social network	Understand, Analyze
CO5	Apply social network in real time applications	Understand, Apply, Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	2			2
CO2	3	3	3	2	3	2
CO3	3	3	3	2	3	3
CO4	3	3	3	3	2	3
CO5	3	3	3	3	3	3

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	10	10	20
Apply (Ap)	20	20	30
Analyze (An)	20	20	30
Evaluate (Ev)	0	0	0
Create (Cr)	0	0	0

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E19 Social Network Analysis								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

BASICS OF SOCIAL NETWORKS Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Social network data-Formal methods- Paths and Connectivity-Graphs to represent social relations-Working with network data - Statistical Properties of Social Networks -Network analysis - Development of Social Network Analysis – Key concepts and measures in network analysis - Discussion networks -Blogs and online communities – Web based networks	**[8]**
Modeling and Visualization Visualizing Online Social Networks - A Taxonomy of Visualizations - Graph Representation - Centrality-Clustering - Node-Edge Diagrams - Visualizing Social Networks with Matrix-Based Representations- Node-Link Diagrams - Hybrid Representations - Modelling and aggregating social network data – Random Walks and their Applications –Use of Hadoop and Map Reduce or Python-Ontological representation of social individuals and relationships	**[8]**
Mining Communities Aggregating and reasoning with social network data, Advanced Representations – Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks – Evaluating Communities – Core Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Node Classification in Social Networks.	**[9]**
Social Influence Analysis Evolution in Social Networks – Framework - Tracing Smoothly Evolving Communities - Models and Algorithms for Social Influence Analysis - Influence Related Statistics - Social Similarity and Influence – Influence Maximization in Viral Marketing - Algorithms and Systems for Expert Location in Social Networks – Expert Location without Graph Constraints - with Score Propagation – Expert Team Formation - Link Prediction in Social Networks - Feature based Link Prediction – Bayesian Probabilistic Models - Probabilistic Relational Models	**[9]**
Text and Opinion Mining Text Mining in Social Networks -Opinion extraction – Sentiment classification and clustering –Temporal sentiment analysis - Irony detection in opinion mining - Wish analysis - Product review mining – Review Classification – Tracking sentiments towards topics over time Databases in social network, Graph based database, Case study – Twitter/ Facebook **PRACTICAL EXERCISES:** 1. Modelling and aggregating social network data. 2. Visualizing Online Social Networks 3. Extracting evolution of Web Community mining 4. Models and Algorithms for Social Influence Analysis 5. Text Mining in Social Networks 6. Sentiment classification using Twitter/ Facebook data	**[11]**
Total Hours	**45**

Text book(s):

1.	Charu C. Aggarwal, “Social Network Data Analytics”, Springer; 2011
2.	Peter Mika, “Social Networks and the Semantic Web”, Springer, 1st edition, 2007
3	Borko Furht, “Handbook of Social Network Technologies and Applications”, Springer, 1st edition, 2010.

Reference(s):

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BoS Chairman

1.	Guandong Xu , Yanchun Zhang and Lin Li, “Web Mining and Social Networking – Techniques and applications”, Springer, 1st edition, 2011
2.	Giles, Mark Smith, John Yen, “Advances in Social Network Mining and Analysis”, Springer, 2010.
3.	Ajith Abraham, Aboul Ella Hassanien, Vaclav Snašel, “Computational Social Network Analysis: Trends, Tools and Research Advances”, Springer, 2009.

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**BASICS OF SOCIAL NETWORKS**	
1.1	Introduction to Web - Limitations of current Web	1
1.2	Development of Semantic Web – Emergence of the Social Web	1
1.3	Social network data-Formal methods- Paths and Connectivity-	1
1.4	Graphs to represent social relations	1
1.5	Working with network data - Statistical Properties of Social Networks	1
1.6	Development of Social Network Analysis – Key concepts and measures in network analysis	1
1.7	Discussion networks -Blogs and online communities	1
1.8	Web based networks	1
2	**Modelling And Visualization**	
2.1	Visualizing Online Social Networks - A Taxonomy of Visualizations	1
2.2	Graph Representation -Centrality-Clustering	1
2.3	Node-Edge Diagrams	1
2.4	Visualizing Social Networks with Matrix-Based Representations- Node-	1
2.5	Link Diagrams - Hybrid Representations	1
2.6	Modelling and aggregating social network data	1
2.7	Random Walks and their Applications	1
2.8	Use of Hadoop and Map Reduce or Python-Ontological representation of social individuals and relationships	1
3	**Mining Communities**	
3.1	Aggregating and reasoning with social network data	1
3.2	Advanced Representations	1
3.3	Extracting evolution of Web Community from a Series of Web Archive	1
3.4	Detecting Communities in Social Networks	1
3.5	Evaluating Communities	1
3.6	Core Methods for Community Detection & Mining	2
3.7	Applications of Community Mining Algorithms	1
3.8	Node Classification in Social Networks	1

4	**Social Influence Analysis**	
4.1	Evolution in Social Networks – Framework - Tracing Smoothly Evolving Communities	1
4.2	Models and Algorithms for Social Influence Analysis	1
4.3	Influence Related Statistics	1
4.4	Social Similarity and Influence – Influence Maximization in Viral Marketing	1
4.5	Algorithms and Systems for Expert Location in Social Networks	1
4.6	Expert Location without Graph Constraints - with Score Propagation	1
4.7	Expert Team Formation - Link Prediction in Social Network	1
4.8	Feature based Link Prediction	1
4.9	Bayesian Probabilistic Models - Probabilistic Relational Models	1
5	**Text and Opinion Mining**	
5.1	Text Mining in Social Networks	1
5.2	Opinion extraction	1
5.3	Sentiment classification and clustering	1
5.4	Temporal sentiment analysis	1
5.5	Irony detection in opinion mining	1
5.6	Wish analysis	1
5.7	Product review mining – Review Classification	1
5.8	Tracking sentiments towards topics over time Databases in social network	1
5.9	Graph based database	1
5.10	Case study – Twitter/ Facebook	2
	Total	45

Course Designers

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

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E31	SOFTWARE TESTING AND QUALITY ASSURANCE	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To understand the basics of testing, test planning &design and test team organization.
- To study the various types of test in the life cycle of the software product.
- To build design concepts for system testing and execution.
- To learn the software quality assurance, metrics, defect prevention techniques.
- To learn the techniques for quality assurance and applying for applications.

Prerequisite

Software Engineering

Course Outcomes

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

CO1	Perform functional and nonfunctional tests in the life cycle of the software product.	Apply
CO2	Investigate system testing and test execution process.	Apply
CO3	Gain the knowledge for various system test categories.	Apply
CO4	Handle defect prevention techniques and software quality assurance metrics.	Apply
CO5	Apply techniques of quality assurance for typical applications.	Apply

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3	2	
CO2	3	3	3	3	3	
CO3	3	3	3	3	2	
CO4	3	3	3	3	3	2
CO5	3	3	3	3		

Assessment Pattern

Cognitive Levels	Continuous Assessment Tests		End Semester Examination(Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	30	30	30
Analyse	10	10	30
Evaluate	-	-	-
Create	-	-	-

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K.S. Rangasamy College of Technology – Autonomous R2022

60 PCS E31- Software Testing and Quality Assurance

M.E. Computer Science and Engineering

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

SOFTWARE TESTING - CONCEPTS, ISSUES, AND TECHNIQUES **[8]**

Quality Revolution- Verification and Validation- Failure, Error, Fault, and Defect- Objectives of Testing, Testing Activities-Test Case Selection -White-Box and Black Testing- Test Planning and design. Test Tools - Automation, Power of Test. Test Team Organization and Management-Test Groups, Software Quality Assurance Group, System Test Team Hierarchy, Team Building.

SYSTEM TESTING **[10]**

System Testing - System Integration Techniques-Incremental, Top Down Bottom Up Sandwich and Big Bang. Software and Hardware Integration- Hardware Design Verification Tests- Hardware and Software Compatibility Matrix. Test Plan for System Integration- Built- in Testing. Functional testing - Testing a Function in Context- Boundary Value Analysis- Decision Tables- Acceptance testing - Selection of Acceptance Criteria- Acceptance Test Plan. Test Execution - Software reliability - Fault and Failure, Factors Influencing Software- Reliability Models.

SYSTEM TEST CATEGORIES **[11]**

System test categories- Taxonomy of System Tests and Interface Tests- Functionality Tests- GUI Tests- Security Tests- Feature Tests- Robustness Tests- Boundary Value Tests- Power Cycling Tests - Interoperability Tests- Scalability Tests- Stress Tests- Load and Stability Tests- Reliability Tests- Regression Tests- Regulatory Tests.

Test Generation from FSM models- State-Oriented Model- Finite-State Machine- Transition Tour Method- Testing with State Verification. Test Architectures-Local, distributed, Coordinated, Remote. System test design- Test Design Factors Requirement Identification- Modeling a Test Design Process- Test Design Preparedness- Metrics- Test Case Design Effectiveness. System test execution- Modeling Defects, Metrics for Monitoring Test Execution. Defect Reports-Defect Causal Analysis- Beta testing- Measuring Test Effectiveness.

SOFTWARE QUALITY **[7]**

Software quality - People 's Quality Expectations- Frameworks and ISO-9126. McCall 's Quality Factors and Criteria – Relationship -Quality Metrics. Quality Characteristics- ISO 9000:2000 Software Quality Standard. Maturity models- Test Process Improvement, Testing Maturity Model.

SOFTWARE QUALITY ASSURANCE **[9]**

Quality Assurance - Root Cause Analysis- modeling, technologies- standards and methodologies for defect prevention- Fault Tolerance and Failure Containment - Safety Assurance and Damage Control, Hazard analysis using fault-trees and event-trees. Comparing Quality Assurance Techniques and Activities. QA Monitoring and Measurement, Risk Identification for Quantifiable Quality Improvement. Case Study: FSM-Based Testing of Web- Based Applications.

Total: 45 Hours

Text book(s):

1. Kshirasagar Nak Priyadarshi Tripathy, "Software Testing And Quality Assurance-Theory and Practice", John Wiley & Sons Inc, First Edition, 2008
2. Jeff Tian, "Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement", John Wiley & Sons, Inc., Hoboken, New Jersey. 2005.

Reference(s) :

1 Daniel Galin, "Software Quality Assurance - From Theory to Implementation", Pearson Education Ltd UK, 2004

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2	Milind Limaye, “Software Quality Assurance”, TMH ,New Delhi, 2011
3	Basu Anirban, “Software Quality Assurance, Testing and Metrics”, PHI Learning Private Limited (2 June 2015)
4	Ivan Mistrik, Richard M Soley, Nour Ali, John Grundy, Bedir Tekinerdogan, “Software Quality Assurance”, Morgan Kaufmann, October 2015

Course Contents and Lecture Schedule

Module No.	Topic	No. of Hours
1	**SOFTWARE TESTING - CONCEPTS, ISSUES, AND TECHNIQUES**	
1.1	Quality Revolution.	1
1.2	Verification and Validation, Failure, Error, Fault, and Defect.	1
1.3	Objectives of Testing.	1
1.4	Testing Activities and Test Case Selection.	1
1.5	White-Box and Black Testing.	1
1.6	Test Planning and design.	1
1.7	Test Tools – Automation, Power of Test.	1
1.8	Test Team Organization and Management- Test Groups, SQA, Hierarchy and Team Building.	1
2	**SYSTEM TESTING**	
2.1	System Integration Techniques.	1
2.2	Incremental, Top Down, Bottom Up, Sandwich and Big Bang.	1
2.3	Software and Hardware Integration.	1
2.4	Hardware Design Verification Tests and Compatibility Matrix.	1
2.5	Test Plan for System Integration and Built- in Testing.	1
2.6	Functional testing: Testing a Function in Context - Boundary Value Analysis.	1
2.7	Decision Tables and Acceptance testing.	1
2.8	Selection of Acceptance Criteria and Test Plan.	1
2.9	Test Execution and Software reliability.	1
2.10	Fault and Failure, Factors Influencing Software and Reliability Models.	1
3	**SYSTEM TEST CATEGORIES**	
3.1	System test categories: Taxonomy of System and Interface Tests.	1
3.2	Functionality Tests: GUI Tests, Security Tests and Feature Tests.	1
3.3	Functionality Tests: Robustness Tests, Boundary Value Tests, Power Cycling Tests, Interoperability Tests and Scalability Tests.	1
3.4	Functionality Tests: - Stress Tests, Load Test, Stability Tests, Reliability Tests, Regression Tests and Regulatory Tests.	1
3.5	Test Generation from FSM models: State-Oriented Model.	1
3.6	Finite-State Machine and Transition Tour Method.	1
3.7	Testing with State Verification.	1
3.8	Test Architectures: Local, distributed, Coordinated and Remote.	1
3.9	System test design: Requirement Identification, Modelling and Test Design Preparedness.	1
3.10	Metrics: Test Case Design Effectiveness, System test execution, Modelling Defects and Metrics for Monitoring Test Execution.	1
3.11	Defect Reports, Defect Causal Analysis and Beta testing.	1
4	**SOFTWARE QUALITY**	
4.1	Software quality: People ‘s Quality Expectations.	1
4.2	Frameworks and ISO-9126.	1

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4.3	McCall ‘s Quality Factors and Criteria and Relationship.	1
4.4	Quality Metrics and Quality Characteristics ISO 9000:2000 Software Quality Standard.	1
4.5	Maturity models.	1
4.6	Testing Maturity Model.	1
4.7	Test Process Improvement.	1
5	**SOFTWARE QUALITY ASSURANCE**	
5.1	Quality Assurance: Root Cause Analysis and modelling technologies.	1
5.2	Standards and methodologies for defect prevention.	1
5.3	Fault Tolerance and Failure Containment.	1
5.4	Safety Assurance and Damage.	1
5.5	Control Hazard analysis using fault-trees and event-trees.	1
5.6	Comparing Quality Assurance Techniques and Activities.	1
5.7	QA Monitoring and Measurement.	1
5.8	Risk Identification for Quantifiable Quality Improvement.	1
5.9	Case Study: FSM-Based Testing of Web- Based Applications.	1
	Total Hours	**45**

Course Designers

1. R.POORNIMA - poornima@ksrct.ac.in

60 PCS E35	**BIG DATA ANALYTICS**	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To understand the computational approaches to Modeling, Feature Extraction and application of Map Reduce algorithms
- To understand the various search algorithms applicable to Big Data
- To analyze and interpret streaming data
- To learn how to handle large data sets in main memory
- To learn the various clustering techniques applicable to Big Data

Prerequisite

Data Mining and Warehousing

Course Outcomes

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

CO1	Design algorithms by employing Map Reduce technique for solving Big Data problems	Remember, Understand, Analyze
CO2	Identify similarities using appropriate measures	Remember, Apply
CO3	Point out problems associated with streaming data and handle them	Remember, Understand, Analyze
CO4	Discuss algorithms for link analysis and frequent itemset mining	Remember, Understand, Apply
CO5	Design solutions for problems in Big Data by suggesting appropriate clusteringtechniques	Remember, Apply,

		Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	1	3	2	1	
CO2	3	3	2	2	2	
CO3	2	2	2	2	3	
CO4	3	3	3	1	2	
CO5	3	2	1	2	2	

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	10
Understand (Un)	10	10	20
Apply (Ap)	15	15	30
Analyze (An)	15	15	30
Evaluate (Ev)	0	10	10
Create (Cr)	0	0	0

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E35 - Big Data Analytics								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Data Mining and Large Scale Files Introduction to Statistical modeling – Machine Learning – Computational approaches to modeling – Summarization – Feature Extraction – Statistical Limits on Data Mining – Distributed File Systems–Map-reduce – Algorithms using Map Reduce – Efficiency of Cluster Computing Techniques.	**[9]**
Similar Items Nearest Neighbor Search – Shingling of Documents – Similarity preserving summaries – Locality sensitive hashing for documents – Distance Measures – Theory of Locality Sensitive Functions –LSH Families – Methods for High Degree of Similarities.	**[9]**
Mining Data Streams Stream Data Model – Sampling Data in the Stream – Filtering Streams – Counting Distance Elements in a Stream – Estimating Moments – Counting Ones in Window – Decaying Windows	**[9]**
Link Analysis and Frequent Item sets Page Rank –Efficient Computation – Topic Sensitive Page Rank – Link Spam – Market Basket Model – Apriori algorithm – Handling Larger Datasets in Main Memory – Limited Pass Algorithm – Counting Frequent Item sets.	**[9]**
Clustering Introduction to Clustering Techniques – Hierarchical Clustering –Algorithms – K-Means – CURE – Clustering in Non – Euclidean Spaces – Streams and Parallelism – **Case Study:** Advertising on the Web – Recommendation Systems	**[9]**
Total Hours	**45**

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Reference book(s):	
1.	Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, Second Edition, 2014.
2.	Jiawei Han, Micheline Kamber, Jian Pei, “Data Mining Concepts and Techniques”, Morgan Kaufman Publications, Third Edition, 2011.
3.	Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & Sons, 2012.
4.	Donald Miner and Adam Shook, “MapReduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop and Other Systems”, 1st edition, O'Reilly Media, 2017.
5.	Philipp K. Janert, “Data Analysis with Open Source Tools: A Hands-On Guide for Programmers and Data Scientist”, 1st Edition, O'Reilly Media, 2010.

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**Data Mining And Large Scale Files**	
1.1	Introduction to Statistical modeling	1
1.2	Machine Learning	1
1.3	Computational approaches to modeling	1
1.4	Summarization	1
1.5	Feature Extraction	1
1.6	Statistical Limits on Data Mining	1
1.7	Distributed File Systems	1
1.8	Map-reduce & – Algorithms using Map Reduce	1
1.9	Efficiency of Cluster Computing Techniques	1
2	**Similar Items**	
2.1	Nearest Neighbor Search	1
2.2	Shingling of Documents	1
2.3	Similarity preserving summaries	1
2.4	Locality sensitive hashing for documents	1
2.5	Distance Measures	1
2.6	Theory of Locality Sensitive Functions	2
2.7	LSH Families	1
2.8	Methods for High Degree of Similarities	1
3	**Mining Data Streams**	
3.1	Stream Data Model	1
3.2	Sampling Data in the Stream	1
3.3	Filtering Streams	1
3.4	Counting Distance Elements in a Stream	1
3.5	Estimating Moments	1

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3.6	Counting Ones in Window	1
3.7	Decaying Windows	1
4	**Link Analysis And Frequent Item sets**	
4.1	Page Rank	1
4.2	Efficient Computation	3
4.3	Topic Sensitive Page Rank	1
4.4	Link Spam	1
4.5	Market Basket Model	1
4.6	Apriori algorithm & Handling Larger Datasets in Main Memory	1
4.7	Limited Pass Algorithm & Counting Frequent Item sets.	2
5	**Clustering**	
5.1	Introduction to Clustering Techniques & Hierarchical Clustering	3
5.2	K-Means ,CURE, Clustering in Non – Euclidean Spaces	2
5.3	Streams and Parallelism	2
5.4	**Case Study:** Advertising on the Web & Recommendation Systems	2
	Total	45

Course Designers

1. Mr. R.Baskar - rbaskar@ksrct.ac.in

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E38	MULTI CORE ARCHITECTURES

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To understand the need for multi-core processors, and their architecture
- To understand the challenges in parallel and multi-threaded programming
- To learn about the various parallel programming paradigms
- To develop multicore programs and design parallel solutions
- To compare OpenMP and MPI implementations

Prerequisite

Computer Architecture

Course Outcomes

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

CO1	Describe multicore architectures and identify their characteristics and challenges	Remember, Understand
CO2	Identify the issues in programming Parallel Processors	Understand, Apply
CO3	Write programs using OpenMP and MPI.	Understand, Apply, Analyze
CO4	Design parallel programming solutions to common problems	Understand, Analyze
CO5	Compare and contrast programming for serial processors and programming for parallel processors	Understand, Apply, Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	2			2
CO2	3	2	3	2	3	2
CO3	3	3	3	2	2	3
CO4	3	3	3	3	2	2
CO5	3	2	3		3	3

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	20	10	20
Apply (Ap)	30	20	30
Analyze (An)	0	20	30
Evaluate (Ev)	0	0	0
Create (Cr)	0	0	0

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

BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E38 - Multi Core Architectures								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

MULTI-CORE PROCESSORS Single core to Multi-core architectures – SIMD and MIMD systems – Interconnection networks – Symmetric and Distributed Shared Memory Architectures – Cache coherence – Performance Issues – Parallel program design.	**[9]**
PARALLEL PROGRAM CHALLENGES Performance – Scalability – Synchronization and data sharing – Data races – Synchronization primitives (mutexes, locks, semaphores, barriers) – deadlocks and livelocks – communication between threads (condition variables, signals, message queues and pipes).	**[9]**
SHARED MEMORY PROGRAMMING WITH OpenMP OpenMP Execution Model – Memory Model – OpenMP Directives – Work-sharing Constructs – Library functions – Handling Data and Functional Parallelism – Handling Loops – Performance Considerations.	**[9]**
DISTRIBUTED MEMORY PROGRAMMING WITH MPI MPI program execution – MPI constructs – libraries – MPI send and receive – Point-to-point and Collective communication – MPI derived datatypes – Performance evaluation.	**[9]**
PARALLEL PROGRAM DEVELOPMENT Case studies – n-Body solvers – Tree Search – OpenMP and MPI implementations and comparison.	**[9]**
Total Hours	**45**

Text book(s):

1.	Peter S. Pacheco, —An Introduction to Parallel Programming, Morgan-Kauffman/Elsevier, 2011.
2.	Darryl Gove, —Multicore Application Programming for Windows, Linux, and Oracle Solaris, Pearson, 2011 (unit 2)

Reference(s):

1.	Michael J Quinn, —Parallel programming in C with MPI and OpenMP, Tata McGraw Hill,2003.
2.	Victor Alessandrini, Shared Memory Application Programming, 1st Edition, Concepts and Strategies in Multicore Application Programming, Morgan Kaufmann, 2015
3.	Yan Solihin, Fundamentals of Parallel Multicore Architecture, CRC Press, 2015

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**MULTI-CORE PROCESSORS**	
1.1	Single core to Multi-core architectures	1
1.2	SIMD and MIMD systems	1
1.3	Interconnection networks	1
1.4	Symmetric and Distributed Shared Memory Architectures	2
1.5	Cache coherence	1
1.6	Performance Issues	2

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1.7	Parallel program design	1
2	**PARALLEL PROGRAM CHALLENGES**	
2.1	Performance	1
2.2	Scalability	1
2.3	Synchronization and data sharing	1
2.4	Data races	1
2.5	Synchronization primitives (mutexes, locks, semaphores, barriers)	2
2.6	deadlocks and livelocks	1
2.7	communication between threads (condition variables, signals, message queues and pipes)	2
3	**SHARED MEMORY PROGRAMMING WITH OpenMP**	
3.1	OpenMP Execution Model	1
3.2	Memory Model	1
3.3	OpenMP Directives	1
3.4	Work-sharing Constructs	1
3.5	Library functions	1
3.6	Handling Data and Functional Parallelism	2
3.7	Handling Loops	1
3.8	Performance Considerations	1
4	**DISTRIBUTED MEMORY PROGRAMMING WITH MPI**	
4.1	MPI program execution	1
4.2	MPI constructs	1
4.3	libraries	2
4.4	MPI send and receive	1
4.5	Point-to-point and Collective communication	2
4.6	MPI derived datatypes	1
4.7	Performance evaluation	1
5	**PARALLEL PROGRAM DEVELOPMENT**	
5.1	Case studies - Introduction	1
5.2	n-Body solvers	2
5.3	Tree Search	2
5.4	OpenMP and MPI implementations	2
5.5	OpenMP and MPI implementations and comparison.	2
	Total	45

Course Designers

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

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E39	DATA ENCRYPTION AND COMPRESSION

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To know the concept of security, types of attack experienced, encryption and authentication to deal with various attacks
- To understand symmetric, asymmetric Key cryptography and user Authentication mechanism
- To study about public key cryptography and message authentication
- To learn data compression and methods of data compression
- To acquire the knowledge about entropy encoding techniques

Prerequisite

NIL

Course Outcomes

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

CO1	Understand the basic needs of Security and types of attacks	Understand
CO2	Realize the Encryption techniques, Symmetric and Asymmetric key Cryptography	Analyze
CO3	Analyze the User Authentication Mechanism	Analyze
CO4	Understand the Public–key Cryptography and Message Authentication	Understand
CO5	Recognize the Data Compression techniques and Entropy encoding	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	2	2	
CO2	3	3	3	2	2	
CO3	3	3	3	2	2	
CO4	3	3	3	2	2	
CO5	3	3	3	2	2	

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	10	10	20
Apply (Ap)	20	20	30
Analyze (An)	20	20	30
Evaluate (Ev)	0	0	
Create (Cr)	0	0	0

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E39- DATA ENCRYPTION AND COMPRESSION								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Introduction to Security Need for security, Security approaches, Principles of security, Types of attacks. **Encryption Techniques:** Plaintext, Cipher text, Substitution & Transposition techniques, Encryption & Decryption, Types of attacks, Key range & Size.	**[9]**
Symmetric and Asymmetric Key Cryptography Algorithm types & Modes, DES, IDEA, Differential & Linear Cryptanalysis, RSA, Symmetric & Asymmetric key together, Digital signature, Knapsack algorithm.	**[9]**
User Authentication Mechanism Authentication basics, Passwords, Authentication tokens, Certificate based& Biometric authentication, Firewall. **Case Studies of Cryptography:** Denial of service attacks, IP spoofing attacks, Secure inter branch payment transactions, Conventional Encryption and Message Confidentiality, Conventional Encryption Principles, Conventional Encryption Algorithms, Location of Encryption Devices, Key Distribution. **Public Key Cryptography and Message Authentication** Approaches to Message Authentication, SHA-1, MD5, Public Key Cryptography Principles, RSA, Digital, Signatures, Key Management.	**[9]**
Data compression Introduction, Need for data compression, Fundamental concept of data compression & coding, Communication model, Compression ratio, Requirements of data compression, Classification. **Methods of Data Compression:** Data compression—Loss less & Lossy	**[9]**
Entropy Encoding Repetitive character encoding, Run length encoding, Zero/Blank encoding; Statistical encoding-- Huffman, Arithmetic & Lempel-Ziv coding; Source encoding-- Vector quantization (Simple vector quantization & with error term); Differential encoding—Predictive coding, Differential pulse code modulation, Delta modulation, Adaptive differential pulse code modulation; Transform basedcoding: Discrete cosine transform & JPEG standards; Fractal compression. Recent trends in encryption and data compression techniques.	**[9]**
Total Hours	**45**

Text book(s):	
1.	Cryptography and Network Security by B.Forouzan, McGraw-Hill.
2.	The Data Compression Book by Nelson, BPB.
Reference(s):	
1.	Cryptography & Network Security by Atul Kahate, TMH.
2.	James A. Storer, “Data Compression: Methods and Theory”, Computer Science Press,1988
3.	David Salomon,“DataCompression:TheCompleteReference”,3rdEdition,Springer,2004.
4.	Colt McAnlis, Aleks Haecky, “Understanding Compression: Data Compression for Modern Developers”1stEdition,O’Reilly,2016.

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**Introduction to Security**	

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1.1	Need for security,	1
1.2	Security approaches	1
1.3	Principles of security,	1
1.4	Types of attacks.	1
1.5	Encryption Techniques: Plaintext, Cipher text	1
1.6	Substitution & Transposition techniques	1
1.7	Encryption & Decryption	1
1.8	Types of attacks	1
1.9	Key range & Size	1
2	**Symmetric and Asymmetric Key Cryptography**	
2.1	Algorithm types & Modes	1
2.2	DES	1
2.3	IDEA	1
2.4	Differential & Linear Cryptanalysis	1
2.5	RSA	1
2.6	Symmetric & Asymmetric key together	2
2.7	Digital signature	1
2.8	Knapsack algorithm	1
3	**User Authentication Mechanism**	
3.1	Authentication basics, Passwords	1
3.2	Authentication tokens,	1
3.3	Certificate based& Biometric authentication, Firewall.	1
3.4	Case Studies of Cryptography: Denial of service attacks, IP spoofing attacks	1
3.5	Secure inter branch payment transactions, Conventional Encryption and Message Confidentiality	1
3.6	Conventional Encryption Principles, Conventional Encryption Algorithms, Location of Encryption Devices, Key Distribution	1
3.7	Public Key Cryptography and Message Authentication Approaches to Message Authentication, SHA-1, MD5, Public Key Cryptography Principles,	2
3.8	RSA, Digital, Signatures, Key Management.	1
4	**Data compression**	
4.1	Introduction	1
4.2	Need for data compression	1
4.3	Fundamental concept of data compression & coding	1
4.4	Communication model	1
4.5	Compression ratio	1

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4.6	Requirements of data compression	1
4.7	Classification	1
4.8	Methods of Data Compression: Data compression	
4.9	Loss less & Lossy	
5	**Entropy Encoding**	
5.1	Repetitive character encoding, Run length encoding,	1
5.2	Zero/Blank encoding; Statistical encoding-- Huffman,	1
5.3	Arithmetic & Lempel-Ziv coding; Source encoding-- Vector quantization	1
5.4	Differential encoding—Predictive coding	1
5.5	Differential pulse code modulation, Delta modulation	1
5.6	Adaptive differential pulse code modulation	1
5.7	Transform based coding: Discrete cosine transform & JPEG standards	1
5.8	Fractal compression	1
5.9	Recent trends in encryption and data compression techniques	1
	Total	45

Course Designers

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

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E41	Mobile and Pervasive Computing

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To learn the basic architecture and concept still Third Generation Communication systems
- To understand the latest 4G Telecommunication System Principles
- To introduce the broad perspective of pervasive concepts and management
- To explore the HCI concepts in Pervasive environment
- To apply the pervasive concepts in mobile environment

Prerequisite

NIL

Course Outcomes

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

CO1	Obtain a thorough understanding of basic architecture and concepts of till Third Generation Communication systems	Understand Apply
CO2	Explain the latest 4G Telecommunication System Principles	Remember Understand Apply
CO3	Incorporate the pervasive concepts	Understand Analyze
CO4	Implement the HCI in Pervasive environment	Remember Understand Analyze
CO5	Work on the pervasive concepts in mobile environment	Understand Apply Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	3		3	
CO2	2	2	3		3	
CO3	2	2	3		3	
CO4	2	2	3		3	
CO5	2	2	3		3	

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	10	10	20
Apply (Ap)	20	20	30
Analyze (An)	20	20	30
Evaluate (Ev)	0	0	0
Create (Cr)	0	0	0

Passed in BoS Meeting held on 20/05/22
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BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E41 Mobile and Pervasive Computing								
M.E. Computer Science and 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

Introduction History–Wireless communications: GSM–DECT–TETRA–UMTS–IMT–2000 – Bluetooth, WiFi, WiMAX, 3G, WATM.- Mobile IP protocols - WAP push architecture- Wml scripts and applications. Data networks –SMS–GPRS–EDGE–Hybrid Wireless 100 Networks–ATM–Wireless ATM.	**[9]**
Overview of a Modern 4G Telecommunications System Introduction. LTE-A System Architecture. LTE RAN. OFDM Air Interface. Evolved Packet Core. LTE Requirements. LTE-Advanced. LTE-A in Release. OFDMA – Introduction. OFDM Principles.LTE Uplink—SC-FDMA. Summary of OFDMA.	**[9]**
Pervasive Concepts and Elements Technology Trend Overview-Pervasive Computing: Concepts -Challenges- Middleware-Context Awareness - Resource Management-Human–Computer Interaction-Pervasive Transaction Processing- Infrastructure and Devices-Wireless Networks-Middleware for Pervasive Computing Systems- ResourceManagement-UserTracking-ContextManagement-ServiceManagement-DataManagement- Security Management-Pervasive Computing Environments-Smart Car Space –Intelligent Campus	**[9]**
HCI in Pervasive Computing Prototype for Application Migration - Prototype for Multimodalities - Human–Computer Interface in Pervasive Environments - HCI Service and Interaction Migration - Context-Driven HCI Service Selection – Interaction Service Selection Overview-User Devices-Service-Oriented Middleware Support-User History and Preference - Context Manager - Local Service Matching - Global Combination - Effective Region - User Active Scope- Service Combination Selection Algorithm	**[9]**
Pervasive Mobile Transactions Pervasive Mobile Transactions - Introduction to Pervasive Transactions - Mobile Transaction Framework –Unavailable Transaction Service – Pervasive Transaction Processing Framework– Context-Aware Pervasive Transaction Model-Context Model for Pervasive Transaction Processing-Context- Aware Pervasive Transaction Model-A Case of Pervasive Transactions-Dynamic Transaction Management-Context-Aware Transaction Coordination Mechanism - Coordination Algorithm for Pervasive Transactions -Participant Discovery-Formal Transaction Verification- PetriNet with Selective Transition.	**[9]**
Total Hours	**45**

Text book(s):

1.	Alan Colman, Jun Han, and Muhammad Ashad Kabir, “Pervasive SocialComputing Socially-Aware Pervasive Systems and Mobile Applications”,Springer,2016.
2.	J.Schiller,“MobileCommunication”,AddisonWesley,2000.

Reference(s):

1.	Juha Korhonen,“Introduction to 4G Mobile Communications”,Artech House Publishers,2014
2.	Frank Adelstein, Sandeep Gupta, Golden Richard and Loren Schwiebert, “Fundamentals of Mobile and Pervasive Computing”,McGraw-HillEducation,2005
3.	Ciprian Dobre Fatos Xhafa, “Pervasive Computing - Next Generation Platforms for Intelligent DataCollection”,1st Edition, Academic Press,2016.
4.	Mohammad S. Obaidat, Mieso Denko, Isaac Woungang, “Pervasive Computing and Networking”, 1stEdition,Wiley,2011.

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Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
	Introduction	
1	Wireless communications	1
2	Mobile IP protocols	1
3	WAP push architecture	1
4	Wml scripts and applications	1
5	Data networks	1
6	SMS–GPRS	1
7	EDGE	1
8	Hybrid Wireless 100 Networks	1
9	ATM and Wireless ATM	1
	Overview of a Modern 4G Telecommunications System	
1	LTE-A System Architecture	1
2	LTE RAN	1
3	OFDM Air Interface	1
4	Evolved Packet Core	1
5	LTE Requirements	1
6	LTE-Advanced	1
7	LTE-A in Release	1
8	OFDMA	1
9	LTE Uplink—SC-FDMA	1
	Pervasive Concepts and Elements	
1	Technology Trend Overview	1
2	Pervasive Computing: Concepts, Challenges	1
3	Middleware, Context Awareness	1
4	Resource Management	1
5	Pervasive Transaction Processing	1
6	Wireless Networks	1
7	Middleware for Pervasive Computing Systems	1
8	Pervasive Computing Environments	1
9	Smart Car Space, Intelligent Campus	1
	HCI in Pervasive Computing	
1	Prototype for Application Migration	1
2	Prototype for Multimodalities	1

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3	HCI Service and Interaction Migration	1
4	Context-Driven HCI Service Selection	1
5	Interaction Service Selection Overview	1
6	Oriented Middleware Support	1
7	User History and Preference	1
8	Local Service Matching	1
9	Service Combination Selection Algorithm	1
	Pervasive Mobile Transactions	
1	Pervasive Mobile Transactions	1
2	Pervasive Transaction Processing Framework	1
3	Aware Pervasive Transaction Model	1
4	Dynamic Transaction Management-	1
5	Aware Transaction Coordination Mechanism	1
6	Coordination Algorithm for Pervasive Transactions	1
7	Participant Discovery	1
8	Formal Transaction Verification	1
9	PetriNet with Selective Transition	1
	Total	45

Course Designers

1. M. Varshana Devi – varshanadevi@ksrct.ac.in

60 PCS E43	DATA PREPARATION AND ANALYSIS

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To understand the various data gathering and preparation techniques
- To learn the various types of data cleaning techniques
- To acquire the knowledge of exploratory analysis
- To learn the visualizations for different types of data
- To prepare the data for analysis and develop meaningful Data Visualizations

Prerequisite

NIL

Course Outcomes

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

CO1	Work in a business environment in which data preparation occurs.	Remember, Understand
CO2	Apply data cleaning techniques on real world data and prepare data for analysis	Remember, Understand, Apply
CO3	Perform exploratory analysis on data, such as calculating descriptive and Comparative statistics	Remember, Analyze
CO4	Experiment visualization techniques for various data analysis tasks	Apply, Understand Analyze
CO5	Illustrate Clustering and association techniques	Knowledge Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3	2	
CO2	3	3	3	3	2	
CO3	3	3	2	2	2	
CO4	3	3	2	3	2	
CO5	3	3	2	3	2	

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	40	40	50
Understand (Un)	10	10	20
Apply (Ap)	10	10	10
Analyze (An)	0	0	20
Evaluate (Ev)	0	0	0
Create (Cr)	0	0	0
Total	60	60	100

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E43 - Data Preparation and Analysis								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Data Gathering and Preparation Data formats, Observations and variables, Types of variables, parsing and transformation, Data Preparation for Modeling and Assessment, Supervised classification, Generalization, Scalability and real-time issues	**[9]**
Data Cleaning Data cleaning Consistency checking, Disk caching systems, Transaction consistency Heterogeneous and missing data, missing at random (MAR), Missing not at random (MNAR) Data Transformation and segmentation	**[9]**
Exploratory Analysis Descriptive and comparative statistics, Univariate Analysis, Central Tendency, Comparative analysis, Clustering, Requirements, Clustering Methods, Hierarchical Methods, Association, Hypothesis Generation and Validation	**[9]**
Data Visualization Data Visualization, Designing for Data Visualization, Time Series, Geo Located Data, Visualize correlations and connections	**[9]**
Visualization Hierarchies Hierarchies, Network Visualization, interactivity, Programmer's Hierarchical Interactive Graphics System (PHIGS), properties of Interactive Visualization, Rapid response to human input.	**[9]**
Total Hours	**45**

Text book(s):

1.	Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, by Glenn J. Myatt
2.	Jason W. Osborne, “Best Practices in Data Cleaning”, First edition, SAGE Publications, Inc,2012.

Reference(s):

1.	IhabF.Ilyas,XuChu,“DataCleaning”,ACMBooks,2019.
2.	JacquelineKazil,KatharineJarmul,“DataWranglingwithPython”,1stedition,O'ReillyMedia,2016.
3.	Tye Rattenbury, Joseph M. Hellerstein, Jeffrey Heer, “Principles of Data Wrangling: Practical TechniquesforData Preparation”,1stEdition,O'Reilly Media,2017.
4.	BradleyC.Boehmke,“DataWranglingwithR”,1stEdition, Springer,2016.

Course Contents and Lecture Schedule

S. No.	Topic	No. of Hours
1	**Data Gathering and Preparation**	
1.1	Data formats	1
1.2	Observations and variables	1
1.3	Types of variables	1
1.4	Parsing and transformation	1
1.5	Data Preparation for Modeling and Assessment	1

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1.6	Supervised classification	1
1.7	Generalization	1
1.8	Attribute construction	1
1.9	Scalability, Real-time issues	1
2	**Data Cleaning**	
2.1	Data cleaning	1
2.2	Consistency checking	1
2.3	Heterogeneous	1
2.4	Missing data	1
2.5	Data Transformation	1
2.6	Types of data transformation	1
2.7	Limitations	1
2.8	Segmentation	2
3	**Exploratory Analysis**	
3.1	Descriptive and comparative statistics	1
3.2	Univariate Analysis	1
3.3	Central Tendency	1
3.4	Comparative analysis	1
3.5	Clustering, Requirements	1
3.6	Clustering Methods	1
3.7	Hierarchical Methods	1
3.8	Association	1
3.9	Hypothesis Generation and Validation	1
4	**Data Visualization**	
4.1	Data visualization	1
4.2	Designing for Data Visualization	2
4.3	Time series	1
4.4	Geo located data	2
4.5	Visualize correlations	2
4.6	Connections	1
	Visualization Hierarchies	
5.1	Hierarchies	2
5.2	Network Visualization	2
5.3	Interactivity	1
5.4	Programmer's Hierarchical Interactive Graphics System (PHIGS)	1
5.5	Properties of Interactive Visualization	2
5.6	Rapid response to human input	1
	Total	**45**

Course Designers

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

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E44	Protocols and Architecture for Mobile ad-hoc networks

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To learn the basics of Ad Hoc Wireless Networks
- To enhance the knowledge on Routing Protocols for Ad Hoc Wireless Networks
- To understand the multi cast routing in Ad Hoc Wireless Networks
- To learn the Security Protocols for Ad Hoc Wireless Networks
- To analyse the energy management in Ad Hoc Wireless Networks.

Prerequisite

Computer Networks

Course Outcomes

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

CO1	Understand the designing issues and classification of protocols in Ad-Hoc Networks	Understand
CO2	Apply the working principles of routing protocols for Ad-Hoc wireless networks	Apply
CO3	Apply the principles and concepts of multicast protocols in Ad-Hoc wireless networks	Apply
CO4	Identify the security requirement and design the secure routing protocols for Ad-Hoc wireless networks	Analyze
CO5	Understand the various power management issues	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2			2
CO2	3	2	3	2	3	3
CO3	3	3	2	2	2	2
CO4	3	3	3	3	2	2
CO5	3	2	3		3	3

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	20	20	20
Apply (Ap)	20	10	40
Analyze (An)	10	10	20
Evaluate (Ev)	0	0	0
Create (Cr)	0	10	0

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E44 - Protocols and Architecture for Mobile Ad-Hoc Networks								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Introduction Ad Hoc Wireless Networks Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet; MAC Protocols for Ad Hoc Wireless Networks-Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols.	**[9]**
Routing Protocols for Ad Hoc Wireless Networks Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Power Aware Routing Protocols	**[9]**
Multi Cast Routing in Ad Hoc Wireless Networks Issues in Designing a Multicast Routing Protocol, Classifications of Multicast Routing Protocols, Energy Efficient Multicasting, Multicasting with Quality of Service Guarantees, Application Dependent Multicast Routing.	**[9]**
Security Protocols for Ad Hoc Wireless Networks Security in Ad Hoc Wireless Networks. Network Security Requirements. Issues and Challenges in Security Provisioning. Network Security Attacks. Key Management. Secure Routing in Ad Hoc Wireless Networks.	**[9]**
Energy Management in Ad Hoc Wireless Networks Classification of Energy Management Schemes, Transmission Power Management Schemes, System Power Management Schemes. Special topics in Ad-hoc and wireless networks.	**[9]**
Total Hours	**45**

Text book(s):

1.	C S. Ram Murthy, B. S. Manoj, Ad Hoc Wireless Networks: Architectures and Protocols, Prentice Hall of India, 2nd ed. 2005.
2.	R. Hekmat, Ad hoc Networks: Fundamental Properties and Network Topologies, Springer, 1st ed. 2006.

Reference(s):

1.	B. Tavli and W. Heinzelman, Mobile Ad Hoc Networks: Energy Efficient Real Time Data Communications, Springer, 1st ed. 2006.
2.	G. Anastasi, E. Ancillotti, R. Bernasconi, and E. S. Biagioni, Multi Hop Ad Hoc Newtorks from Theory to Reality, Nova Science Publishers, 2008
3.	Stefano Basagni, Marco Conti, Silvia Giordano, Ivan Stojmenovic, “Mobile Ad Hoc Networking”, John Wiley & Sons, 2004
4.	Reddy G Ram Mohana and Kiran M, “Mobile Ad Hoc Networks: Bio-Inspired Quality of Service Aware Routing Protocols”, Taylor & Francis Inc, 2016.

Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Introduction**	
1.1	Ad Hoc Wireless Networks Issues in Ad Hoc Wireless Networks	2
1.2	Ad Hoc Wireless Internet	2
1.3	MAC Protocols for Ad Hoc Wireless Networks	2
1.4	Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks	2
1.5	Classifications of MAC Protocols.	1
2	**Routing Protocols for Ad Hoc Wireless Networks**	
2.1	Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks	3

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2.2	Classifications of Routing Protocols	3
2.3	Power Aware Routing Protocols.	3
3	**Multi Cast Routing in Ad Hoc Wireless Networks**	
3.1	Issues in Designing a Multicast Routing Protocol	2
3.2	Classifications of Multicast Routing Protocols	2
3.3	Energy Efficient Multicasting	2
3.4	Multicasting with Quality of Service Guarantees	2
3.5	Application Dependent Multicast Routing	1
4	**Security Protocols for Ad Hoc Wireless Networks**	
4.1	Security in Ad Hoc Wireless Networks	1
4.2	Network Security Requirements	1
4.3	Issues and Challenges in Security Provisioning	2
4.4	Network Security Attacks	1
4.5	Key Management	2
4.6	Secure Routing in Ad Hoc Wireless Networks	2
5	**Energy Management in Ad Hoc Wireless Networks**	
5.1	Classification of Energy Management Schemes	2
5.2	Transmission Power Management Schemes	2
5.3	System Power Management Schemes.	2
5.4	Special topics in Ad-hoc and wireless networks.	3
	Total	**45**

Course Designers

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

60 PCS E45	SECURE CODING	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- Understand the basics of secure programming
- Understand the most frequent programming errors leading to software vulnerabilities
- Identify and analyze security problems in software
- Understand and protect against security threats and software vulnerabilities
- Effectively apply their knowledge othe construction of secure software systems

Prerequisite

NIL

Course Outcomes

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

CO1	Understand the basics of secure programming	Understand
CO2	Understand the most frequent programming errors leading to software Vulnerability and its Security	Understand
CO3	Identify and analyze software security fundamentals,SQL injections, Failure to Handle the Errors and Security Touch points	Analyze
CO4	Understand the Cross Site Scripting, weak password and improper use of cryptography	Understand
CO5	Analyze the knowledge of Information Leakage and trusting network name resolution	Analyze

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

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Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	3	2			2
CO2	3	2	3	2	3	3
CO3	3	2	2	2	2	2
CO4	3	3	3	3	2	2
CO5	3	2	3		3	3

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	20	20	20
Apply (Ap)	20	10	40
Analyze (An)	10	10	20
Evaluate (Ev)	-	-	-
Create (Cr)	-	10	-

K.S.Rangasamy College of Technology – Autonomous R2022

60 PCS E45 - Secure Coding

M.E. Computer Science and Engineering

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

Introduction Introduction to software security, managing software security risk, selecting software development technologies, An open source and closed source, Guiding principles for software security, Auditing software, Buffer overflows, Access control, Race conditions, Input validation, Password authentication	**[9]**
Attacks Anti-tampering, protecting against denial of service attack, Copy protection schemes, Client-side security, Database security, Applied cryptography, Randomness and determinism	**[9]**
Software Security Buffer Over run, Format String Problems, Integer Overflow, and Software Security Fundamentals, SQL Injection, Command Injection, Failure to Handle Errors, and Security Touch points.	**[9]**
Cross Site Scripting Cross Site Scripting, Magic URLs, Weak Passwords, Failing to Protect Data, Weak random numbers,improper use of cryptography.	**[9]**
Information Leakage Information Leakage, Race Conditions, Poor usability, Failing to protect network traffic, improper use of PKI, trusting network name resolution **Case Study** Case study of Cross Site Scripting, Magic URLs, Weak Passwords, Buffer overflows, Access control, Race conditions.	**[9]**
Total Hours	**45**
Text book(s):	

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1.	J.Viega, M.Messier, “Secure Programming Cook book for C and C++”, 1st edition, O′Reilly, 2003.
2.	M. Howard, D. LeBlanc, “Writing Secure Code”, 2nd edition, Microsoft Press US, 2002.
Reference(s):	
1.	MarkGraff, “Secure Coding–Principles & Practices”, 1st edition, O′Reilly,2003.
2.	Neil Daswani, Christoph Kern, and Anita Kesavan, “Foundations of Security”, 1st edition, Apress, 2007.
3.	John Viega, Gary R., “Building Secure Software: How to Avoid Security Problems the Right Way”, 1st edition, Addison-Wesley Professional, 2001.
4.	J.Viega, G. McGraw. Building Secure Software, Addison Wesley.

Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Introduction**	
1.1	Introduction to software security	2
1.2	Managing software security risk	2
1.3	Selecting software development technologies	2
1.4	Auditing software, Buffer overflows, Access control, Race conditions	2
1.5	Input validation, Password authentication.	1
2	**Attacks**	
2.1	Anti-tampering, Protecting against denial of service attack, Copy protection	3
2.2	Schemes, Client-side security	3
2.3	Database security, Applied cryptography, Randomness and determinism	3
3	**Software Security**	
3.1	Buffer Over run, Format String Problems	2
3.2	Integer Overflow, and Software Security Fundamentals	2
3.3	SQL Injection	2
3.4	Command Injection	2
3.5	Failure to Handle Errors, and Security Touch points	1
4	**Cross Site Scripting**	
4.1	Cross Site Scripting	1
4.2	Magic URLs, Weak Passwords	1
4.3	Failing to Protect Data	2
4.4	Weak random numbers	1
4.5	Improper use of cryptography.	4
5	**Information Leakage**	
5.1	Information Leakage, Race Conditions, Poor usability	2
5.2	Failing to protect network traffic	2
5.3	improper use of PKI	2
5.4	Trusting network name resolution	3
	Total	**45**

Course Designers

1. Mr.M.PRAKASH – prakashm@ksrct.ac.in

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E47	WIRELESS SENSOR NETWORKS

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- Architect sensor networks for various application setups
- Devise appropriate data dissemination protocols and model links cost
- Understanding the fundamental concepts of wireless sensor networks
- To have a basic knowledge of the various protocols at various layers
- Evaluate the performance of sensor networks and identify bottlenecks

Prerequisite

Computer Networks

Course Outcomes

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

CO1	Understand the fundamental concepts of wireless Sensor Networks and its architecture	Remember, Understand
CO2	Illustrate the operations of Network Simulator-3	Understand, Apply
CO3	Apply Discrete time Markov Chain and describe MAC Protocol design	Understand, Apply, Analyze
CO4	Summarize the varies attacks and Static and Dynamic Key Distribution	Understand, Analyze
CO5	Describe the MANET protocols and Software applications	Understand, Apply, Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	2	2	2	2
CO2	3	2	3	2	3	2
CO3	3	3	3	2	2	3
CO4	3	3	3	3	2	2
CO5	3	2	3	2	3	3

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember (Re)	10	10	20
Understand (Un)	20	10	20
Apply (Ap)	30	20	30
Analyze (An)	0	20	30
Evaluate (Ev)	0	0	0
Create (Cr)	0	0	0

Passed in BoS Meeting held on 20/05/22
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BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2022								
60 PCS E47 - Wireless Sensor Networks								
M.E. Computer Science and Engineering								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Introduction to Wireless Sensor Networks: Course Information, Introduction to Wireless Sensor Networks: Motivations, Applications, Performance metrics, History and Design factors **Network Architecture:** Traditional layered stack, Cross-layer designs, Sensor Network Architecture **Hardware Platforms:** Motes, Hardware parameters	**[9]**
Introduction to ns-3: Introduction to Network Simulator 3 (ns-3), Description of the ns-3 core module and simulation example.	**[9]**
Medium Access Control Protocol design: Fixed Access, Random Access, WSN protocols: synchronized, duty-cycled - **Introduction to Markov Chain:** Discrete time Markov Chain definition, properties, classification and analysis - **MAC Protocol Analysis:** Asynchronous duty-cycled. X-MAC Analysis(Markov Chain)	**[10]**
Security: Possible attacks, countermeasures, SPINS, Static and dynamic key distribution	**[8]**
Routing Protocols: Introduction, MANET protocols - **Routing protocols for WSN**: Resource-aware routing, Data-centric, Geographic Routing, Broadcast, Multicast - **Opportunistic Routing Analysis**: Analysis of opportunistic routing (Markov Chain) Advanced topics in wireless sensor networks. **Advanced topics** Recent development in WSN standards, software applications	**[9]**
Total Hours	**45**

Text book(s):	
1.	W. Dargie and C. Poellabauer, “Fundamentals of Wireless Sensor Networks –Theory and Practice”, Wiley 2010.
2.	Kazem Sohraby, Daniel Minoli and TaiebZnati, “wireless sensor networks -Technology, Protocols, and Applications”, Wiley Interscience, 2007.
Reference(s):	
1.	Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann, “Wireless Sensor Network Technologies for the Information Explosion Era”, springer, 2010.
2.	Zheng Jun, Abbas Jamalipour, “Wireless Sensor Networks - A Networking Perspective”, Wiley india Pvt. Ltd
3.	C.S. Raghavendra, Krishna M. Sivalingam, Taieb Znati, “Wireless Sensor Networks”, First Edition, Springer, 2004.
4.	Andreas Willig Holger Karl, “Protocols and Architectures for Wireless Sensor Networks”, Wiley, 2011.

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**Introduction to Wireless Sensor Networks**	
1.1	Motivations, Applications	1
1.2	Performance metrics	1

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1.3	History and Design factors	1
	Network Architecture	
1.4	Traditional layered stack	1
1.5	Cross-layer designs	2
1.6	Sensor Network Architecture	1
	Hardware Platforms	
1.7	Motes, Hardware parameters	2
2	**Introduction to ns-3**	
2.1	Introduction to Network Simulator 3 (ns-3)	3
2.2	Description of the ns-3 core module	3
2.3	Description of the ns-3 core module example	3
3	**Medium Access Control Protocol design**	
3.1	Fixed Access, Random Access	1
3.2	WSN protocols: synchronized, duty-cycled	2
3.3	**Introduction to Markov Chain:** Discrete time Markov Chain definition	1
3.4	Discrete time Markov Chain definition properties	1
3.5	classification and analysis	1
3.6	**MAC Protocol Analysis:** Asynchronous duty-cycled	2
3.7	X-MAC Analysis(Markov Chain)	1
4	**Security**	
4.1	Possible attacks	2
4.2	countermeasures	2
4.3	SPINS	2
4.4	Static and dynamic key distribution	2
5	**Routing Protocols**	
5.1	Introduction, MANET protocols	1
5.2	**Routing protocols for WSN**: Resource-aware routing	1
5.3	Data-centric	1
5.4	Geographic Routing	1
5.5	Broadcast	1
5.6	Multicast	1
5.7	**Opportunistic Routing Analysis**: Analysis of opportunistic routing (Markov Chain)	1
5.8	Advanced topics in wireless sensor networks	1
5.9	Recent development in WSN standards, software applications.	1
	Total	45

Course Designers

1. Dr. K. Prasanth - prasanth@ksrct.ac.in

Passed in BoS Meeting held on 20/05/22
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BoS Chairman

60 PCS 301	Compiler Optimization Techniques

Category	L	T	P	Credit
PC	3	0	0	3

Objective

- To understand optimizations techniques for single program blocks
- To apply optimizations on procedures and low level code
- To explore and enhance inter procedural optimizations
- To enhance resource utilization

Prerequisite

Compiler Design

Course Outcomes

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

CO1	Identify the different optimization techniques that are possible for a sequence of code	Remember, Understand
CO2	Design performance enhancing optimization techniques.	Remember, Apply
CO3	Manage procedures with optimal overheads	Remember, Apply
CO4	Understand modern programming language features and constructs	Remember, Understand, Apply
CO5	Learn to work on a larger software project	Analyze, Apply, Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2		3	
CO2	3	3	2		3	
CO3	3	3	2		3	
CO4	3	3	2		3	
CO5	3	3	2		3	
3 – Strong; 2 – Medium; 1 – Some						

Assessment Pattern

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

Passed in BoS Meeting held on 20/05/22
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BoS Chairman

60 PCS 301 – Compiler Optimization Techniques								
M.E. Computer Science and Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Intermediate Representation Of Programs And Analysis Structure of an Optimizing Compiler – Compiler Construction tools – LIR, MIR, HIR, DAG, Syntax Tree and Postfix. Analysis: Control Flow Analysis, Iterative Data Flow Analysis, Static Single Assignment – A Linear Time Algorithm for Placing φ-Nodes, Basic Block Dependence, Alias Analysis. Introduction to LLVM – Compiling a language.	[9]
Local and Loop Optimizations Early Optimizations: Constant-Expression Evaluation – Scalar Replacement of Aggregates – Algebraic Simplifications and Re-association – Value Numbering – Copy Propagation – Sparse Conditional Constant Propagation. Redundancy Elimination: Common – Subexpression Elimination – Loop-Invariant Code Motion – Partial-Redundancy Elimination – Redundancy Elimination and Reassociation – Code Hoisting. Loop Optimizations: Induction Variable Optimizations – Unnecessary Bounds Checking Elimination. LLVM pass –LLVM Test Infrastructure	[9]
Procedure Optimization and Scheduling Procedure Optimizations: Tail-Call Optimization and Tail-Recursion Elimination – Procedure Integration – In-Line Expansion – Leaf-Routine Optimization and Shrink Wrapping. Code Scheduling: Instruction Scheduling – Speculative Loads and Boosting – Speculative Scheduling – Software Pipelining – Trace Scheduling – Percolation Scheduling. Control-Flow and Low-Level Optimizations: Unreachable-Code Elimination – Straightening – If Simplifications – Loop Simplifications –Loop Inversion Un-switching – Branch Optimizations – Tail Merging or Cross Jumping – Conditional Moves – Dead-Code Elimination – Branch Prediction – Machine Idioms and Instruction Combining. LLVM API procedure optimization.	[9]
Inter Procedural Optimization Symbol table Runtime Support – Interprocedural Analysis and Optimization: Interprocedural Control-Flow Analysis – The Call Graph – Interprocedural Data-Flow Analysis – Interprocedural Constant Propagation – Interprocedural Alias Analysis – Interprocedural Optimizations – Interprocedural Register Allocation – Aggregation of Global References. LLVM – Interprocedural Analyses.	[9]
Optimizing For Memory Register Allocation: Register Allocation and Assignment – Local Methods – Graph Coloring Priority Based Graph Coloring. Computations on Iteration Spaces- Optimization for the Memory Hierarchy: Impact of Data and Instruction Caches – Instruction-Cache Optimization – Scalar Replacement of Array Elements – Data-Cache Optimization – Scalar vs. Memory-Oriented Optimizations. Software Prefetching – Parallelization – Instruction Level Parallelism – Automatic Parallelization.	[9]
Total Hours	**45**

References:

1.	Steven.S. Muchnick, Advanced Compiler Design and Implementation, Morgan Kaufman Publishers, 1997
2.	Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers: Principles, Techniques, and Tools”, Addison Wesley, Second Edition, 2007.
3.	Y.N.Srikant, Priti Shankar, “The Compiler Design Handbook – Optimizations and Machine Code Generation”, CRC Press, Second Edition, 2008.
4.	Andrew W. Appel, Jens Palsberg, “Modern Compiler Implementation in Java”, Cambridge University Press, Second Edition, 2002.
5.	Keith Cooper, Linda Torczon, “Engineering a Compiler”, Morgan Kaufmann, Second Edition, 2011.

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6.	Randy Allen and Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan Kaufman, 2001.

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**Introduction**	
1.1	Structure of an Optimizing Compiler	1
1.2	Compiler Construction tools	1
1.3	LIR, MIR, HIR, DAG, Syntax Tree and Postfix	1
1.4	Analysis: Control Flow Analysis	1
1.5	Iterative Data Flow Analysis	1
1.6	Static Single Assignment	1
1.7	A Linear Time Algorithm for Placing φ-Nodes, Basic Block Dependence, Alias Analysis	1
1.8	Introduction to LLVM	1
1.9	Compiling a language	1
2	**Local And Loop Optimizations**	
2.1	Early Optimizations: Constant-Expression Evaluation, Scalar Replacement of Aggregates	1
2.2	Algebraic Simplifications and Re-association	1
2.3	Value Numbering	1
2.4	Copy Propagation	1
2.5	Sparse Conditional Constant Propagation	1
2.6	Redundancy Elimination: Common – Subexpression Elimination, Loop-Invariant Code Motion	1
2.7	Partial-Redundancy Elimination – Redundancy Elimination and Reassociation, Code Hoisting	1
2.8	Loop Optimizations: Induction Variable Optimizations – Unnecessary Bounds Checking Elimination	1
2.9	LLVM pass –LLVM Test Infrastructure	1
3	**Procedure Optimization and Scheduling**	
3.1	Procedure Optimizations: Tail-Call Optimization and Tail-Recursion Elimination	1
3.2	Procedure Integration – In-Line Expansion – Leaf-Routine Optimization and Shrink Wrapping	1
3.3	Code Scheduling: Instruction Scheduling – Speculative Loads and Boosting	1
3.4	Speculative Scheduling – Software Pipelining – Trace Scheduling, Percolation	1

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	Scheduling	
3.5	Control-Flow and Low-Level Optimizations: Unreachable-Code Elimination – Straightening	1
3.6	If Simplifications – Loop Simplifications –Loop Inversion Un-switching	1
3.7	Branch Optimizations – Tail Merging or Cross Jumping – Conditional Moves – Dead-Code Elimination	1
3.8	Branch Prediction – Machine Idioms and Instruction Combining	1
3.9	LLVM API procedure optimization	1
4	**Inter Procedural Optimization**	
4.1	Symbol table Runtime Support	1
4.2	Interprocedural Analysis and Optimization: Interprocedural Control- Flow Analysis – The Call Graph	1
4.3	Interprocedural Data-Flow Analysis	1
4.4	Interprocedural Constant Propagation	1
4.5	Interprocedural Alias Analysis	1
4.6	Interprocedural Optimizations	1
4.7	Interprocedural Register Allocation	1
4.8	Aggregation of Global References	1
4.9	LLVM – Interprocedural Analyses.	1
5	**Optimizing for Memory**	
5.1	Register Allocation: Register Allocation and Assignment	1
5.2	Local Methods – Graph Coloring Priority Based Graph Coloring	1
5.3	Computations on Iteration Spaces	1
5.4	Optimization for the Memory Hierarchy: Impact of Data and Instruction Caches	1
5.5	Instruction-Cache Optimization, Scalar Replacement of Array Elements	1
5.6	Data-Cache Optimization	1
5.7	Scalar vs. Memory-Oriented Optimizations	1
5.8	Software Prefetching – Parallelization	1
5.9	Instruction Level Parallelism – Automatic Parallelization	1
	Total	45

Course Designers

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

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BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R 2022								
60 PCS 3P1 Project Work Phase I								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	0	0	20	60	10	50	50	100
Objective(s)	• To import the practical knowledge to the students and also to make them to carry out the technical procedures in their project work. • To provide an exposure to the students to refer, read and review the research articles, journals and conference proceedings relevant to their project work and placing this as their beginning stage for their final presentation.							
Course Outcomes	**At the end of the course, the students will be able to** 1. Survey the relevant literature such as books, national/international refereed journals and contact resource persons for the selected topic of research. 2. Use different experimental techniques/different software/ computational/analytical tools. 3. Design and develop an experimental set up/ equipment/test rig. 4. Conduct tests on existing set ups/equipment and draw logical conclusions from the results after analyzing them. 5. Work in a research environment or in an industrial environment.							
The Project Work will start in semester III and should preferably be a problem with research potential and should involve scientific research, design, generation/collection and analysis of data, determining solution and must preferably bring out the individual contribution. Seminar should be based on the area in which the candidate has undertaken the dissertation work as per the common instructions for all branches of M.E/M. Tech. The examination shall consist of the preparation of report consisting of a detailed problem statement and a literature review. The preliminary results (if available) of the problem may also be discussed in the report. The work has to be presented in front of the examiners panel set by Head and PG coordinator. The candidate has to be in regular contact with his guide and the topic of dissertation must be mutually decided by the guide and student.								

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K.S.Rangasamy College of Technology – Autonomous R 2022								
60 PCS 4P1 – Project Work Phase II								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	0	0	32	60	16	50	50	100
Objective(s)	• This enables and strengthens the students to carry out the project on their own and to implement their innovative ideas to forefront the risk issues and to retrieve the hazards by adopting suitable assessment methodologies and staring it to global.							
Course Outcomes	**At the end of the course, the students will be able to** 1. Develop attitude of lifelong learning and will develop interpersonal skills to deal with people working in diversified field will. 2. Write technical reports and research papers to publish at national and international level. 3. Develop strong communication skills to defend their work in front of technically qualified audience.							
It is a continuation of Project work started in semester III. He has to submit the report in prescribed format and also present a seminar. The dissertation should be presented in standard format as provided by the department. The candidate has to prepare a detailed project report consisting of introduction of the problem, problem statement, literature review, objectives of the work, methodology (experimental set up or numerical details as the case may be) of solution and results and discussion. The report must bring out the conclusions of the work and future scope for the study. . The work has to be presented in front of the examiners panel consisting of an approved external examiner, an internal examiner and a guide, co-guide etc. as decided by the Head and PG coordinator. The candidate has to be in regular contact with his guide.								

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BoS Chairman

60 PCS E51	Natural Language Processing

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To study about Natural Language Processing
- To learn about information retrieval architecture
- To study about text mining
- To know the concepts of multilingualism concepts
- To understand the various applications in machine translation and natural language generation

Prerequisite

NIL

Course Outcomes

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

CO1	Express the fundamental concepts of Natural Language Processing	Understand
CO2	Explain the Information Retrieval architecture.	Apply
CO3	Recognize the text mining and pattern extraction techniques. Develop the concept of thread execution with thread priority and to perform remote data access	Understand
CO4	Apply multilingual Information Retrieval and Speech processing in various applications.	Apply
CO5	Identify the applications in machine translation and natural language generation.	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	2		2	
CO2	3	3	3		3	2
CO3	2	3	3		3	
CO4	3	3	3	2	3	2
CO5	2	3	3	2	3	2
3 – Strong; 2 – Medium; 1 – Some						

Assessment Pattern

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

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Evaluate	-	-	-
Create	-	10	-

K. S. Rangasamy College of Technology – Autonomous R2022								
60 PCS E51 – Natural Language Processing								
M.E. Computer Science and Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Introduction Natural Language Processing – Linguistic Background- Spoken language input and output Technologies – Written language Input - Mathematical Methods - Statistical Modeling and Classification Finite State methods Grammar for Natural Language Processing – Parsing – Semantic and Logic Form – Ambiguity Resolution – Semantic Interpretation.	[9]
Information Retrieval Information Retrieval architecture - Indexing- Storage – Compression Techniques – Retrieval Approaches – Evaluation - Search engines- commercial search engine features- comparison- performance measures – Document Processing - NLP based Information Retrieval – Information Extraction.	[9]
Text Mining Categorization – Extraction based Categorization- Clustering- Hierarchical Clustering- Document Classification and routing- finding and organizing answers from Text search – use of categories and clusters for organizing retrieval results – Text Categorization and efficient Summarization using Lexical Chains – Pattern Extraction.	[9]
Generic Issues Multilingualism – Multilingual Information Retrieval and Speech processing - Multimodality – Text and Images – Modality Integration - Transmission and Storage – Speech coding- Evaluation of systems – Human Factors and user Acceptability.	[9]
Applications Machine Translation – Transfer Metaphor - Interlingua and Statistical Approaches - Discourse Processing – Dialog and Conversational Agents – Natural Language Generation – Surface Realization and Discourse Planning.	[9]
Total Hours	**45**

Text Book(s):

1.	Daniel Jurafsky and James H. martin, " Speech and Language Processing" , 2000
2.	Ron Cole, J.Mariani, et.al "Survey of the State of the Art in Human Language Technology", Cambridge University Press, 1997.

Reference book(s) :

1.	Steven Bird, Ewan Klein and Edward Loper, "Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit", O'Reilly Media; 1st edition (July 21, 2009)
2.	Sowmya Vajjala, Bodhisattwa Majumder and Anuj Gupta, "Practical Natural Language Processing: A Comprehensive Guide to Building Real-World NLP Systems" O'Reilly Media; 1st edition (July 7, 2020)
3.	Michael W. Berry " Survey of Text Mining: Clustering, Classification and Retrieval", Springer Verlag, 2003
4.	Christopher D.Manning and HinrichSchutze, "Foundations of Statistical Natural Language Processing ", MIT Press, 1999.

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Course Contents and Lecture Schedule

S.No	Topic	No. of Hours
1	**Introduction**	
1.1	Natural Language Processing-Linguistic Background	1
1.2	Spoken language input and output Technologies	1
1.3	Written language Input - Mathematical Methods	1
1.4	Statistical Modeling and Classification Finite State methods	1
1.5	Grammar for Natural Language Processing – Parsing	2
1.6	Semantic and Logic Form	1
1.7	Ambiguity Resolution	1
1.8	Semantic Interpretation	1
2	**Information Retrieval**	
2.1	Information Retrieval architecture	1
2.2	Indexing- Storage – Compression Techniques	1
2.3	Retrieval Approaches – Evaluation	2
2.4	Search engines- commercial search engine features	1
2.5	comparison- performance measures	1
2.6	Document Processing - NLP based Information Retrieval	2
2.7	Information Extraction	1
3	**Text Mining**	
3.1	Categorization – Extraction based Categorization	1
3.2	Clustering- Hierarchical Clustering	1
3.3	Document Classification and routing	1
3.4	finding and organizing answers from Text search	1
3.5	use of categories and clusters for organizing retrieval results	2
3.6	Text Categorization and efficient Summarization using Lexical Chains	2
3.7	Pattern Extraction.	1
4	**Generic Issues**	
4.1	Multilingualism	1
4.2	Multilingual Information Retrieval and Speech processing	2
4.3	Multimodality – Text and Images	2
4.4	Modality Integration	1
4.5	Transmission and Storage – Speech coding	1
4.6	Evaluation of systems	1
4.7	Human Factors and user Acceptability	1
5	**Applications**	
5.1	Machine Translation	1
5.2	Transfer Metaphor	1
5.3	Interlingua and Statistical Approaches	2
5.4	Discourse Processing	1
5.5	Dialog and Conversational Agents	1
5.6	Natural Language Generation	1
5.7	Surface Realization and Discourse Planning.	2
	Total	**45**

Course Designers

1. Mr.K.Kaviarasu– kaviarasuk@ksrct.ac.in

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E52	Web Analytics and Development

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To explore the use of social network analysis
- To understand the web analytics tools
- To introduce the web search and retrieval algorithms
- To know the social connection techniques
- To get the knowledge of robustness in social involvements and diffusion of innovation

Prerequisite

NIL

Course Outcomes

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

CO1	Gain the knowledge of Social network and Web data	Remember
CO2	Familiar with web analytics tools and development	Understand, Apply,Analyze
CO3	Illustrate Web Search and Retrieval techniques	Understand, Apply
CO4	Identify the Affiliation and identity of social connects	Understand, Apply
CO5	Analyze the robustness in social involvements and diffusion of innovation	Understand, Apply, Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	3	1	2	2
CO2	3	2	3	1	3	1
CO3	3	1	2	1	3	2
CO4	3	3	3	2	2	2
CO5	3	3	3	2	2	2
3 – Strong; 2 – Medium; 1 – Some						

Assessment Pattern

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

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

K. S. Rangasamy College of Technology – Autonomous R2022								
60 PCS E52 – Web Analytics and Development								
M.E. Computer Science and Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Introduction Social network and Web data and methods, Graph and Matrices, Basic measures for individuals and networks, Information Visualization.	[9]
Web Analytic Tool Click Stream Analysis, A/B testing, Online Surveys.	[9]
Web Search and Retrieval Search Engine Optimization, Web Crawling and indexing, Ranking Algorithms, Web traffic models.	[9]
Making Connection Link Analysis, Random Graphs and Network evolution, Social Connects: Affiliation and identity.	[9]
Connection Connection Search, Collapse, Robustness Social involvements and diffusion of innovation	[9]
Total Hours	**45**

Text Book(s):

1.	Hansen, Derek, Ben Sheiderman, Marc Smith. 2011. Analyzing Social Media Networks with NodeXL: Insights from a Connected World. Morgan Kaufmann, 304.
2.	Avinash Kaushik. 2009. Web Analytics 2.0: The Art of Online Accountability.

Reference(s):

1.	Easley, D. & Kleinberg, J. (2010). Networks, Crowds, and Markets: Reasoning About a Highly Connected World. New York: Cambridge University Press.
2.	Wasserman, S. & Faust, K. (1994). Social network analysis: Methods and applications. New York: Cambridge University Press. Monge, P. R. & Contractor, N. S. (2003).
3.	Pedro Sostre, Jennifer LeClaire, “Web Analytics For Dummies”, John Wiley & Sons (8 May 2007)
4.	Himanshu Sharma, “Maths and Stats for Web Analytics and Conversion Optimization”, Optimize Smart; 1st edition (October 24, 2015)

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**Introduction**	
1.1	Social network and Web data and methods	2
1.2	Graph and Matrices	3
1.3	Basic measures for individuals and networks	2

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1.4	Information Visualization	2
2	**Web Analytic Tool**	
2.1	Click Stream Analysis	3
2.2	A/B testing	3
2.3	Online Surveys	3
3	**Web Search and Retrieval**	
3.1	Search Engine Optimization	2
3.2	Web Crawling and indexing	3
3.3	Ranking Algorithms	2
3.4	Web traffic models	2
4	**Making Connection**	
4.1	Link Analysis	3
4.2	Random Graphs and Network evolution	3
4.3	Social Connects: Affiliation and identity	3
5	**Connection**	
5.1	Connection Search	3
5.2	Collapse	3
5.3	Robustness Social involvements and diffusion of innovation	3
	Total	45

Course Designers

1. Ms. S.B. Thamarai Selvi – thamaraiselvi@ksrct.ac.in

Passed in BoS Meeting held on 20/05/22
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60 PCS E53	Human and Computer Interaction

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- Learn the foundations of Human Computer Interaction
- Be familiar with the design technologies for individuals and persons with disabilities
- Be aware of mobile Human Computer interaction
- To understand the mobile ecosystem
- To design web interfaces

Prerequisite

Compiler Design

Course Outcomes

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

CO1	To Learn the foundations of Human Computer Interaction	Understand
CO2	Familiar with the design technologies for individuals and persons with disabilities	Understand
CO3	Aware of mobile Human Computer interaction	Understand
CO4	Design web interfaces using tools	Analyse
CO5	Know about recent trends in Speech Recognition and Translation, Multimodal System	Analyse

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	2	-	1	2	2
CO2	3	2	-	2	2	2
CO3	1	2	-	3	3	2
CO4	1	2	2	3	3	2
CO5	2	2	2	3	3	2
3 – Strong; 2 – Medium; 1 – Some						

Assessment Pattern

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

Passed in BoS Meeting held on 20/05/22
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BoS Chairman

K. S. Rangasamy College of Technology – Autonomous R2022								
60 PCS E53 – Human and Computer Interaction								
M.E. Computer Science and Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory –processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity-Paradigms.	[10]
Interactive Design: Basics–process–scenarios–navigation–screen design–Iteration and prototyping. HCIin software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules–principles, standards, guidelines, rules. Evaluation Techniques–Universal Design. Cognitive models–Socio-Organizational issues and stakeholder requirements–Communication and collaboration models-Hypertext, Multimedia and WWW.	[11]
Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games - Mobile Information Architecture, Mobile2.0, Mobile Design: Elements of Mobile Design, Tools.	[9]
Designing Web Interfaces — Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages ,Process Flow .Case Studies	[9]
Recent Trends : Speech Recognition and Translation ,Multimodal System	[6]
Total Hours	**45**

Text Book(s):

1.	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition,PearsonEducation,2004 (UNITI,II&III)
2.	BrianF ling, “Mobile Design and Development”, First Edition ,OReilly MediaInc.,2009(UNIT– IV)

Reference(s):

1.	Bill Scottand Theresa Neil, “Designing Web Interfaces”, First Edition, OReilly, 2009.(UNIT-V)
2.	Preece,J.etal, “Human-computer interaction”, Addison-Wesley Publishing Company, Inc., MA,1994
3.	Shneiderman,B.,“Designingtheuserinterface:Strategiesforeffectivehuman-computerinteraction”,2nd edition, Addison-Wesley Publishing Company, Inc., Reading, MA,1992
4.	Laurel,B.,“Theartofhuman-computerinterfacedesign”,Addison-WesleyPublishingCompany,Inc., Reading MA,1990

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**Introduction**	
1.1	I/O Channels	1
1.2	Memory	1

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1.3	Reasoning and Problem Solving	1
1.4	The Computer: Devices	1
1.5	Memory	1
1.6	Processing and Networks	1
1.7	Interaction: Models	1
1.8	Frameworks and Ergonomics	1
1.9	Styles and Elements	1
1.10	Interactivity and Paradigms	1
2	**Local And Loop Optimizations**	
2.1	Basics	1
2.2	Process and Scenarios	1
2.3	Navigation and Screen Design	1
2.4	Iteration and Prototyping	1
2.5	HClin Software Process, Software lifecycle	1
2.6	Usability Engineering, Prototyping in practice and Design Rationale	1
2.7	Design Rules- Principles, Standards	1
2.8	Guidelines, Rules	1
2.9	Evaluation Techniques- Universal Design	1
2.10	Cognitive models–Socio-Organizational issues and stake holder requirements	1
2.11	Communication and collaboration models-Hypertext, Multimedia and WWW.	1
3	**Procedure Optimization and Scheduling**	
3.1	Platforms	1
3.2	Application Frameworks	1
3.3	Types of Mobile Applications: Widgets, Applications	1
3.4	Games: Mobile Information Architecture	2
3.5	Mobile 2.0	1
3.6	Mobile Design: Elements of mobile design	2
3.7	Tools	1
4	**Inter Procedural Optimization**	
4.1	Designing Web Interfaces	1
4.2	Drag and Drop	1
4.3	Direct Selection	1
4.4	Contextual tools	1
4.5	Overlays, Inlays	1
4.6	Virtual Pages	1
4.7	Process Flow	1

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4.8	Case Studies	2
5	**Optimizing for Memory**	
5.1	Speech Recognition	2
5.2	Translation	2
5.3	Multimodal System	2
	Total	45

Course Designers

1. Ms. B. Janani –janani@ksrct.ac.in

60 PCS E54	**Malware Analysis and Reverse Engineering**	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To provide an insight to fundamentals of malware analysis which includes analysis of JIT compilers for malware detection in legitimate code.
- To know the concept of malware forensics
- To understand the complexity of Malware and Kernel Debugging
- To get the knowledge of DNS filtering and reverse engineering
- To able to understand Researching and Mapping Source Domains/Ips

Prerequisite

NIL

Course Outcomes

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

CO1	Understand the concept of malware and reverse engineering.	Understand
CO2	Implement tools and techniques of malware analysis.	Apply
CO3	Recognize the complexity of Malware and Kernel Debugging	Understand
CO4	Gain knowledge on Memory Forensics and Volatility	Apply
CO5	Apply the concepts of Researching and Mapping Source Domains/IPs	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	2		2	
CO2	3	3	3		3	2
CO3	2	3	3		3	
CO4	3	3	3	2	3	2
CO5	2	3	3	2	3	2
3 – Strong; 2 – Medium; 1 – Some						

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Assessment Pattern

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

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60 PCS E54 – Malware Analysis and Reverse Engineering							
M.E. Computer Science and Engineering							
Semester	Hours / Week			Total hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Malware Analysis Fundamentals of Malware Analysis (MA), Reverse Engineering Malware (REM) Methodology, Brief Overview of Malware analysis lab setup and configuration, Introduction to key MA tools and techniques, Behavioral Analysis vs. Code Analysis, Resources for Reverse-Engineering Malware (REM) Understanding Malware Threats, Malware indicators, Malware Classification, Examining ClamAVSignatures, Creating Custom ClamAV Databases, Using YARA to Detect Malware Capabilities, Creating a Controlled and Isolated Laboratory, Introduction to MA Sandboxes, Ubuntu, Zeltser'sREMnux, SANS SIFT, Sandbox Setup and Configuration New Course Form, Routing TCP/IP Connections, Capturing and Analyzing Network Traffic, Internet simulation using INetSim, Using Deep Freeze to Preserve Physical Systems, Using FOG for Cloning and Imaging Disks, Using MySQL Database to Automate FOG Tasks, Introduction to Python ,Introduction to x86 Intel assembly language, Scanners: Virus Total, Jotti, and NoVirus Thanks, Analyzers: Threat Expert, CWSandbox, Anubis, Joebox, Dynamic Analysis Tools: Process Monitor, Regshot, HandleDiff, Analysis Automation Tools: Virtual Box, VM Ware, Python , Other Analysis Tools.	[10]
Malware Forensics Using TSK for Network and Host Discoveries, Using Microsoft Offline API to Registry Discoveries , Identifying Packers using PEiD, Registry Forensics with Reg Ripper Plu-gins:, Bypassing Poison Ivy's Locked Files, Bypassing Conficker's File System ACL Restrictions, Detecting Rogue PKI Certificates.	[9]
Malware and Kernel Debugging Opening and Attaching to Processes, Configuration of JIT Debugger for Shellcode Analysis, Controlling Program Execution, Setting and Catching Breakpoints, Debugging with Python Scripts and Py Commands**,** DLL Export Enumeration, Execution, and Debugging**,** Debugging a VMware Workstation Guest (on Windows)**,** Debugging a Parallels Guest (on Mac OS X). Introduction to WinDbg Commands and Controls, Detecting Rootkits with WinDbgScripts**,** Kernel Debugging with IDA Pro.	[9]
Memory Forensics and Volatility Memory Dumping with MoonSols Windows Memory Toolkit**,** Accessing VM Memory Files Overview of Volatility, Investigating Processes in Memory Dumps**,** Code Injection and Extraction**,** Detecting and Capturing Suspicious Loaded DLLs**,** Finding Artifacts in Process Memory**,** Identifying Injected Code with Malfind and YARA.	[9]

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Researching and Mapping Source Domains/IPs Using WHOIS to Research Domains, DNS Hostname Resolution, Querying Passive DNS, Checking DNS Records, Reverse IP Search New Course Form, Creating Static Maps, Creating Interactive Maps. **Case Study** Case study of Finding Artifacts in Process Memory, Identifying Injected Code with Malfind and YARA	[8]
Total Hours	**45**

Text Book(s):	
1.	Michael Sikorski, Andrew Honig "Practical Malware Analysis: The Hands-On Guide to DissectingMalicious Software" publisher Williampollock
2.	Eldad Eilam, "Reversing: Secrets of Reverse Engineering", Wiley; 1st edition (April 15, 2005)
Reference(s):	
1.	Monnappa K A, "Learning Malware Analysis: Explore the concepts, tools, and techniques to analyze and investigate Windows malware", Packt Publishing (June 29, 2018)
2.	Abhijit Mohanta, Anoop Saldanha, "Malware Analysis and Detection Engineering: A Comprehensive Approach to Detect and Analyze Modern Malware", Apress; 1st ed. edition (September 23, 2020)
3.	A. P. David, "Ghidra Software Reverse Engineering for Beginners: Analyze, identify, and avoid malicious code and potential threats in your networks and systems", Packt Publishing (January 8, 2021)
4.	Michael Ligh et al., "Malware Analyst's Cookbook and DVD: Tools and Techniques for Fighting Malicious Code", Wiley; 1st edition (November 2, 2010)

Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1	**Introduction**	
1.1	Fundamentals of Malware Analysis (MA), Reverse Engineering Malware (REM) Methodology	1
1.2	Brief Overview of Malware analysis lab setup and configuration, Introduction to key MA tools and techniques, Behavioral Analysis vs. Code Analysis	1
1.3	Resources for Reverse-Engineering Malware (REM) Understanding Malware Threats, Malware indicators, Malware Classification, Examining ClamAVSignatures	1
1.4	Creating Custom ClamAV Databases, Using YARA to Detect Malware Capabilities, Creating a Controlled and Isolated Laboratory	1
1.5	Introduction to MA Sandboxes, Ubuntu, Zeltser'sREMnux, SANS SIFT, Sandbox Setup and Configuration New Course Form, Routing TCP/IP Connections	1
1.6	Capturing and Analyzing Network Traffic, Internet simulation using INetSim, Using Deep Freeze to Preserve Physical Systems, Using FOG for Cloning and Imaging Disks	1
1.7	Using MySQL Database to Automate FOG Tasks, Introduction to Python , Introduction to x86 Intel assembly language	1
1.8	Scanners: Virus Total, Jotti, and NoVirus Thanks, Analyzers: Threat Expert, CWSandbox, Anubis, Joebox	1
1.9	Dynamic Analysis Tools:Process Monitor, Regshot, HandleDiff, Analysis	1
1.10	Automation Tools: Virtual Box, VM Ware, Python , Other Analysis Tools.	1
2	**Local And Loop Optimizations**	

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2.1	Using TSK for Network and Host Discoveries	1
2.2	Using Microsoft Offline API to Registry Discoveries	1
2.3	Identifying Packers using PEiD	2
2.4	Registry Forensics with Reg Ripper Plu-gins	2
2.5	Bypassing Poison Ivy's Locked Files	1
2.6	Bypassing Conficker's File System ACL Restrictions, Detecting Rogue PKI Certificates.	2
3	**Procedure Optimization and Scheduling**	
3.1	Opening and Attaching to Processes, Configuration of JIT Debugger for Shellcode Analysis	2
3.2	Controlling Program Execution, Setting and Catching Breakpoints	1
3.3	Debugging with Python Scripts and Py Commands	1
3.4	DLL Export Enumeration, Execution, and Debugging	1
3.5	Debugging a VMware Workstation Guest (on Windows), Debugging a Parallels Guest (on Mac OS X)	2
3.6	Introduction to WinDbg Commands and Controls	1
3.7	Detecting Rootkits with WinDbgScripts, Kernel Debugging with IDA Pro.	1
4	**Inter Procedural Optimization**	
4.1	Memory Dumping with MoonSols Windows Memory Toolkit	1
4.2	Accessing VM Memory Files Overview of Volatility	1
4.3	Investigating Processes in Memory Dumps	1
4.4	Code Injection and Extraction	2
4.5	Detecting and Capturing Suspicious Loaded DLLs	1
4.6	Finding Artifacts in Process Memory	1
4.7	Identifying Injected Code with Malfind and YARA.	2
5	**Researching and Mapping Source Domains/Ips**	
5.1	Using WHOIS to Research Domains	1
5.2	DNS Hostname Resolution, Querying Passive DNS	1
5.3	Checking DNS Records	1
5.4	Reverse IP Search New Course Form	1
5.5	Creating Static Maps	1
5.6	Creating Interactive Maps	1
5.7	Case study of Finding Artifacts in Process Memory, Identifying Injected Code with Malfind and YARA	2
	Total	45

Course Designers

1. Mr.K.Kaviarasu – kaviarasuk@ksrct.ac.in

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman

60 PCS E55	Image Processing and Analysis

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To understand the basics of spatial domain processing
- To know about frequency domain processing techniques
- To understand the process of segmentation and Edge detection methods
- To learn basic image analysis, segmentation, edge detection, corner Detection, and learn morphological operations and texture analysis
- To understand the processing of color images, image compression techniques

Prerequisite

NIL

Course Outcomes

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

CO1	Explore and implement spatial domain processing	Remember
CO2	Familiar with frequency domain processing tools	Understand
CO3	Critically analyse different approaches for segmentation and edge detection	Analyze
CO4	Recognize the interest point detection methods, morphological operators and texture analysis	Understand, Apply
CO5	Explore the possibility of applying Image compression techniques in color images	Understand, Apply, Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	2	2	2
CO2	3	2	3	2	2	1
CO3	3	2	2	2	2	2
CO4	3	2	2	2	2	2
CO5	3	2	2	2	2	2
3 – Strong; 2 – Medium; 1 – Some						

Assessment Pattern

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

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

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K. S. Rangasamy College of Technology – Autonomous R2022								
60 PCS E55 – Image Processing and Analysis								
M.E. Computer Science and Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Spatial Domain Processing Introduction to image processing – Imaging modalities – Image file formats – Image sensing and acquisition – Image sampling and quantization – Noise models – Spatial filtering operations – Histograms – Smoothing filters– Sharpening filters – Fuzzy techniques for spatial filtering - Spatial filters for noise removal.	[9]
Frequency Domain Processing Frequency domain – Review of Fourier Transform (FT), Discrete Fourier Transform (DFT), and Fast Fourier Transform (FFT) – Filtering in frequency domain – Image smoothing – Image sharpening – Selective filtering – Frequency domain noise filters – Wavelets – Haar Transform – Multiresolution expansions – Wavelet transforms –Wavelets based image processing	[9]
Segmentation and Edge Detection Thresholding techniques – Region growing methods – Region splitting and merging – Adaptive thresholding – Threshold selection – Global valley – Histogram concavity – Edge detection – Template matching – Gradient operators – Circular operators – Differential edge operators – Hysteresis thresholding – Canny operator – Laplacian operator – Active contours - Object Segmentation	[9]
Interest Points, Morphology, and Texture Corner and interest point detection – Template matching – Second order derivatives – Median filter based detection – Harris interest point operator – Corner orientation – Local invariant feature detectors and descriptors – Morphology – Dilation and erosion – Morphological operators – Grayscale morphology – Noise and morphology – Texture – Texture analysis – Co-occurrence matrices – Laws' texture energy approach – Ade's eigen filter approach	[9]
Color Images and Image Compression Color models – Pseudo colors – Full-color image processing – Color transformations – Smoothing and sharpening of color images – Image segmentation based on color – Noise in color images. Image Compression – Redundancy in images – Coding redundancy – Irrelevant information in images – Image compression models – Basic compression methods – Digital image watermarking.	[9]
Total Hours	**45**

Text Book(s):

1. E. R. Davies, “Computer & Machine Vision”, Fourth Edition, Academic Press, 2012.
2. W. Burger and M. Burge, “Digital Image Processing: An Algorithmic Introduction using Java”, Springer, 2008.

Reference(s):

1. John C. Russ, “The Image Processing Handbook”, Sixth Edition, CRC Press, 2011.
2. R. C. Gonzalez and R. E. Woods, “Digital Image Processing”, Third Edition, Pearson,2008.
3. Mark Nixon and Alberto S. Aquado, “Feature Extraction & Image Processing for Computer Vision”,Third Edition, Academic Press, 2012.
4. D. L. Baggio et al., “Mastering OpenCV with Practical Computer Vision Projects”, Packt Publishing,2012.
5. Jan Erik Solem, “Programming Computer Vision with Python: Tools and algorithms for analyzing images”, O'Reilly Media, 2012.

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Course Contents and Lecture Schedule

S.No.	Topic	No.of Hours
1	**Spatial Domain Processing**	
1.1	Introduction to image processing	1
1.2	Imaging modalities,Image file formats	1
1.3	Image sensing and acquisition	1
1.4	Image sampling and quantization	1
1.5	Noise models	1
1.6	Spatial filtering operations,Histograms	1
1.7	Smoothing filters - Sharpening filters	1
1.8	Fuzzy techniques for spatial filtering	1
1.9	Spatial filters for noise removal	1
2	**Frequency Domain Processing**	
2.1	Frequency domain : Review of Fourier Transform (FT)	1
2.2	Discrete Fourier Transform (DFT)	1
2.3	Fast Fourier Transform (FFT)	1
2.4	Filtering in frequency domain	1
2.5	Image smoothing, image sharpening ,selective filtering	1
2.6	Wavelets – Haar Transform	1
2.7	Multiresolution expansions	1
2.8	Wavelet transforms	1
2.9	Wavelets based image processing	1
3	**Segmentation and Edge Detection**	
3.1	Thresholding techniques - Region growing methods, Region splitting and merging	1
3.2	Adaptive thresholding - threshold selection	2
3.3	Global valley - histogram concavity	1
3.4	Edge detection - template matching	1
3.5	Gradient operators - circular operators - differential edge operators	1
3.6	Hysteresis thresholding	1
3.7	Canny operator - Laplacian operator	1
3.8	Active contours - object segmentation	1
4	**Interest Points, Morphology, and Texture**	

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4.1	Corner and interest point detection	1
4.2	Template matching - second order derivatives	2
4.3	Median filter based detection	1
4.4	Harris interest point operator - corner orientation	1
4.5	Local invariant feature detectors and descriptors - morphology, dilation and erosion	1
4.6	Morphological operators - grayscale morphology - noise and morphology	1
4.7	Texture, texture analysis - co-occurrence matrices	1
4.8	Laws' texture energy approach- Ade's eigen filter approach	1
5	**Color Images and Image Compression**	
5.1	Color models , pseudo colors - full color image processing	1
5.2	Color transformations	1
5.3	Smoothing and sharpening of color images - image segmentation based on colors	2
5.4	Noise in color images - Image Compression	1
5.5	Redundancy in images - coding redundancy - irrelevant information in images	2
5.6	Image compression models - basic compression methods	1
5.7	Digital image watermarking.	1
	Total	45

Course Designers

1. Ms. S.B. Thamarai Selvi – thamaraiselvi@ksrct.ac.in

60 PCS E61	**Game Theory**	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To introduce the idea of a game, its solutions concepts, and other basic notions and tools of game theory
- To formalize the view of strategic thinking and rational choice by using the tools of game theory
- To sketch the connections between game theory, computer science, and economics, especially emphasizing the computational issues
- To initiate contemporary topics in the intersection of game theory, computer science, and economics
- To apply game theory in searching, auctioning and trading

Prerequisite

NIL

Course Outcomes

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

CO1	Discuss the notion of a strategic game and equilibria	Remember
CO2	Discuss the use of Nash Equilibrium for other problems	Remember
CO3	Identify key strategic aspects of game theory in a real world situation	Apply
CO4	Identify some applications that need aspects of Bayesian Games	Apply
CO5	Implement a Virtual Business scenario using Game theory	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3		3	3		
CO2	3		3	3		
CO3	3		3	3		
CO4	3		3	3		
CO5	3		3	3		
3 – Strong; 2 – Medium; 1 – Some						

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	15	10	20
Understand	10	15	20
Apply	25	25	40
Analyse	10	10	20
Evaluate	-	-	-
Create	-	-	-

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60 PCS E61 – Game Theory

M.E. Computer Science and Engineering

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

INTRODUCTION: Introduction – Making rational choices: basics of Games – strategy – preferences – payoffs – Mathematical basics – Game theory – Rational Choice – Basic solution concepts-non-cooperative versus cooperative games – Basic computational issues – finding equilibria and learning in games-Typical application areas for game theory (e.g. Google's sponsored search, eBay auctions, electricity trading markets).	[9]
GAMES: Games with Perfect Information – Strategic games – prisoner's dilemma, matching pennies – Nash equilibria – theory and illustrations – Cournot's and Bertrand's models of oligopoly – auctions – mixed strategy equilibrium – zero-sum games – Extensive Games with Perfect Information – repeated games (prisoner's dilemma) – subgame perfect Nash equilibrium; computational issues.	[9]

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GAMES WITH IMPERFECT INFORMATION: Games with Imperfect Information – Bayesian Games – Motivational Examples – General Definitions – Information aspects – Illustrations – Extensive Games with Imperfect – Information – Strategies – Nash Equilibrium – Beliefs and sequential equilibrium – Illustrations – Repeated Games – The Prisoner's Dilemma – Bargaining	[9]
NON-COOPERATIVE GAME THEORY: Non-cooperative Game Theory – Self-interested agents – Games in normal form – Analyzing games: from optimality to equilibrium – Computing Solution Concepts of Normal – Form Games – Computing Nash equilibria of two-player, zero-sum games –Computing Nash equilibria of two-player, general-sum games – Identifying dominated strategies.	[9]
MECHANISM DESIGN: Aggregating Preferences – Social Choice – Formal Model – Voting – Existence of social functions – Ranking systems – Protocols for Strategic Agents: Mechanism Design – Mechanism design with unrestricted preferences – Efficient mechanisms – Vickrey and VCG mechanisms (shortest paths) – Combinatorial auctions – profit maximization Computational applications of mechanism design – applications in Computer Science – Google's sponsored search – eBay auctions – K-armed bandits.	[9]
Total Hours	**45**

Text Book(s):	
1.	M. J. Osborne, An Introduction to Game Theory. Oxford University Press, 2004
2.	M. Machler, E. Solan, S. Zamir, Game Theory, Cambridge University Press, 2013.
Reference(s):	
1.	N. Nisan, T. Roughgarden, E. Tardos, and V. V. Vazirani (Editors), Algorithmic Game Theory. Cambridge University Press, 2007.
2.	A.Dixit and S. Skeath, Games of Strategy, Second Edition. W W Norton & Co Inc, 2004.
3.	YoavShoham, Kevin Leyton-Brown, Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Foundations, Cambridge University Press 2008
4.	Zhu Han, DusitNiyato, WalidSaad, TamerBasar and Are Hjorungnes, "Game Theory in Wireless and Communication Networks", Cambridge University Press, 2012.

Course Contents and Lecture Schedule

Module No.	Topic	No. of Hours
1	INTRODUCTION:	
1.1	Introduction ,Making rational choices: basics of Games , strategy, preferences ,payoffs	1
1.2	Mathematical basics	1
1.3	Game theory, Rational Choice	1
1.4	Basic solution concepts, non-cooperative versus cooperative games	2
1.5	Basic computational issue, finding equilibria and learning in games	2
1.6	Typical application areas for game theory (e.g. Google's sponsored search, eBay auctions, electricity trading markets).	2
2	GAMES :	
2.1	Games with Perfect Information, Strategic games	1
2.2	Prisoner's dilemma, matching pennies	1
2.3	Nash equilibria	1
2.4	theory and illustrations, Cournot's and Bertrand's	1

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	models of oligopoly	
2.5	Auctions, mixed strategy equilibrium	1
2.6	zero-sum games, Extensive Games with Perfect Information	1
2.7	Repeated games (prisoner's dilemma)	1
2.8	Subgame perfect Nash equilibrium; computational issues.	2
3	GAMES WITH IMPERFECT INFORMATION:	
3.1	Games with Imperfect Information, Bayesian Games, Illustrations	1
3.2	Motivational Examples	1
3.3	General Definitions, Information aspects, Illustrations	1
3.4	Extensive Games with Imperfect	1
3.5	Information, Strategies	1
3.6	Nash Equilibrium	1
3.7	Beliefs and sequential equilibrium	1
3.8	Repeated Games, The Prisoner's Dilemma, Bargaining	2
4	NON-COOPERATIVE GAME THEORY :	
4.1	Non-cooperative Game Theory	1
4.2	Self-interested agents, Games in normal form	1
4.3	Analyzing games: from optimality to equilibrium	1
4.4	Computing Solution Concepts of Normal	1
4.5	Form Games	1
4.6	Computing Nash equilibria of two-player, zero-sum games	2
4.7	Computing Nash equilibria of two-player, general-sum games, Identifying dominated strategies	2
5	MECHANISM DESIGN	
5.1	Aggregating Preferences	1
5.2	Formal Model ,Voting	1
5.3	Social Choice ,Existence of social functions	1
5.4	Ranking systems	1
5.5	Protocols for Strategic Agents: Mechanism Design, Mechanism design with unrestricted preferences, Efficient mechanisms	1
5.6	Vickrey and VCG mechanisms (shortest paths)	1
5.7	Combinatorial auctions, profit maximization Computational applications of mechanism design	1
5.8	Applications in Computer Science	1
5.9	Google's sponsored search ,eBay auctions,K-armed bandits.	1
	Total Hours	**45**

Course Designers

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

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60 PCS E62	Adhoc and Wireless Sensor Networks

Category	L	T	P	Credit
PE	3	0	0	3

Objective

- To learn about the issues in the design of wireless ad hoc networks
- To understand the working of protocols in different layers of mobile ad hoc and sensor networks
- To expose the students to different aspects in sensor networks
- To understand various traffic generators and models for sensor networks
- To understand various security issues in ad hoc and sensor networks and its solutions

Prerequisite

NIL

Course Outcomes

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

CO1	Identifying suitable routing protocols for various scenarios of ad hoc networks.	Understand, Apply
CO2	To explore various mobility models for MANETs.	Understand, Apply
CO3	Identify different issues in wireless sensor networks.	Analyze
CO4	Analyse the performance of IEEE 802.15.4.	Analyze
CO5	Identify and critique security issues in ad hoc and sensor networks.	Understand, Apply, Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3		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)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	20	10	30
Apply	30	20	30
Analyse	-	20	30
Evaluate	-	-	-
Create	-	-	-

Passed in BoS Meeting held on 20/05/22
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K. S. Rangasamy College of Technology – Autonomous R2022								
60 PCS E62 – Adhoc and Wireless Sensor Networks								
M.E. Computer Science and Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

FUNDAMENTALS AND ROUTING PROTOCOLS OF WIRELESS AD HOC NETWORKS Introduction – Applications of Mobile Ad Hoc Networks (MANETs) – Medium Access Control Layer – Topology Control – Routing Protocols – Broadcasting – Multicasting – Internet Connectivity for MANETs – Security in MANETs - Scenario Based Performance Analysis of Various Routing Protocols in MANETs	[9]
MOBILITY MODELS AND OVERHEAD CONTROL MECHANISMS IN MANETS Description of Various Mobility Models – Simulation and Analysis of Various Mobility Models – Overhead Analysis in Hierarchical Routing Scheme – Overhead Minimization Techniques – Energy Models	[9]
WIRELESS SENSOR NETWORKS (WSN) Applications of WSNs - Hardware and Software Issues in WSN - Design Issues of MAC Protocols - Deployment - Localization - Synchronization - Calibration - Network Layer Issues - Classification of Routing Protocols - Transport Layer Issues - Data Aggregation and Dissemination - Database Centric and Querying	[9]
PERFORMANCE ANALYSIS AND EVALUATION Overview of IEEE 802.15.4 and its Characteristics – Data Gathering Paradigm – Simulation Environment and Result Analysis of IEEE 802.15.4 - Zigbee Routing Protocols – Traffic Generators – Traffic Model - Simulation Environment and Result Analysis of Zigbee Routing Protocols.	[9]
SECURITY IN ADHOC AND SENSOR NETWORKS Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Anti-tamper techniques – Water marking techniques – Defence against routing attacks – Secure Ad hoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS.	[9]
Total Hours	**45**

Text Book(s):

1.	Subir Kumar Sarkar, "Wireless Sensor and Ad Hoc Networks Under Diversified Network Scenarios", Auerbach Publications, 2012.
2.	Holger Karl, Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", Wiley India Private Limited, 2011.

Reference(s):

1.	ErdalÇayirci, ChunmingRong, "Security in Wireless Ad Hoc and Sensor Networks", John
2.	Carlos De MoraisCordeiro, Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks: Theory and
3.	WaltenegusDargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks Theory and Practice", Wiley India Private Limited, 2014.
4.	Adrian Perrig, J.D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Kluwer Academic Publishers, Springer, 2002.

Course Contents and Lecture Schedule

S.No.	Topic	No.of Hours
1	**Fundamentals and Routing Protocols of Wireless Ad Hoc**	

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	Networks	
1.1	Introduction – Applications of Mobile Ad Hoc Networks (MANETs)	1
1.2	Medium Access Control Layer	1
1.3	Topology Control	1
1.4	Routing Protocols	1
1.5	Broadcasting	1
1.6	Multicasting	1
1.7	Internet Connectivity for MANETs	1
1.8	Security in MANETs	1
1.9	Scenario Based Performance Analysis of Various Routing Protocols in MANETs	1
2	**Mobility Models and Overhead Control Mechanisms in MANETS**	
2.1	Description of Various Mobility Models	1
2.2	Simulation and Analysis of Various Mobility Models	2
2.3	Overhead Analysis in Hierarchical Routing Scheme	2
2.4	Overhead Minimization Techniques	2
2.5	Energy Models	2
3	**Wireless Sensor Networks (WSN)**	
3.1	Applications of WSNs	1
3.2	Hardware and Software Issues in WSN	1
3.3	Design Issues of MAC Protocols	1
3.4	Deployment – Localization	1
3.5	Synchronization – Calibration	1
3.6	Network Layer Issues	1
3.7	Classification of Routing Protocols, Transport Layer Issues	1
3.8	Data Aggregation and Dissemination	1
3.9	Database Centric and Querying	1
4	**Performance Analysis and Evaluation**	
4.1	Overview of IEEE 802.15.4 and its Characteristics	1
4.2	Data Gathering Paradigm	2
4.3	Simulation Environment and Result Analysis of IEEE 802.15.4	1
4.4	Zigbee Routing Protocols	1
4.5	Traffic Generators	1
4.6	Traffic Model	1
4.7	Simulation Environment and Result Analysis of Zigbee Routing Protocols	2

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5	**Security in Adhoc and Sensor Networks**	
5.1	Security Attacks – Key Distribution and Management	1
5.2	Intrusion Detection	1
5.3	Software based Anti-tamper techniques	1
5.4	Water marking techniques	1
5.5	Defence against routing attacks	1
5.6	Secure Ad hoc routing protocols	1
5.7	Broadcast authentication WSN protocols – TESLA – Biba	2
5.8	Sensor Network Security Protocols – SPINS	1
	Total	45

Course Designers

1. Ms. R.Poornima – poornima@ksrct.ac.in

60 PCS E63	**Recommender System**	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To understand the various searching techniques
- To learn the various types of content based filtering and collaborative filtering
- To learn the various hybridization design
- To acquire the knowledge of evaluating recommender system
- To learn the various types of recommender system

Prerequisite

NIL

Course Outcomes

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

CO1	Learn the key concepts of information retrieval, various searching techniques	Remember, Understand
CO2	Gain the knowledge of various types of content-based filtering and collaborative filtering	Remember, Understand, Apply
CO3	Understand the various hybridization design	Remember, Analyze
CO4	Acquire the knowledge of evaluating recommender system	Apply, Understand Analyze
CO5	Learn the various types of recommender system	Remember, Understand

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Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3		2
CO2	3	3	3	3		2
CO3	3	2	2	2		2
CO4	3	3	2	3		3
CO5	3	3	2	3		3
3 – Strong; 2 – Medium; 1 – Some						

Assessment Pattern

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

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60 PCS E63 – Recommender System

M.E. Computer Science and Engineering

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

Introduction Overview of Information Retrieval, Retrieval Models, Search and Filtering Techniques, Relevance Feedback, User Profiles, Recommender system functions, Matrix operations, covariance matrices, Understanding ratings, Applications of recommendation systems, Issues with recommender system.	[9]
Content-based Filtering High level architecture of content-based systems, Advantages and drawbacks of content based filtering, Item profiles, Discovering features of documents, pre-processing and feature extraction, Obtaining item features from tags, Methods for learning user profiles, Similarity based retrieval, Classification algorithms. **Collaborative Filtering** User-based recommendation, Item-based recommendation, Model based approaches, Matrix factorization, Attacks on collaborative recommender systems.	[9]
Hybrid Approaches Opportunities for hybridization, Monolithic hybridization design: Feature combination, Feature augmentation, Parallelized hybridization design: Weighted, Switching, Mixed, Pipelined hybridization design: Cascade Meta- level, Limitations of hybridization strategies.	[9]
Evaluating Recommender System Introduction, General properties of evaluation research, Evaluation designs: Accuracy, Coverage, confidence, novelty, diversity, scalability, serendipity, Evaluation on historical datasets, Offline evaluations.	[9]

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Types of Recommender Systems Recommender systems in personalized web search, knowledge-based recommender system, Social tagging recommender systems, Trust-centric recommendations, Group recommender systems.		[9]
	Total Hours	**45**
Text Book(s):		
1.	Jannach D., Zanker M. and FelFering A., "Recommender Systems: An Introduction", First Edition, Cambridge University Press, 2011.	
2.	Charu C. Aggarwal, "Recommender Systems: The Textbook", Ist Edition, Springer, 2016.	
Reference(s):		
1.	Ricci F., Rokach L., Shapira D., Kantor B.P., "Recommender Systems Handbook", Ist edition, Springer, 2011	
2.	Kembellec Gerald, "Recommender Systems", ISTE Ltd and John Wiley & Sons Inc, 2014.	
3.	Manouselis N., Drachsler H., Verbert K., Duval E., "Recommender Systems For Learning", First Edition,Springer, 2013.	
4.	Lior Rokach, Bracha Shapira, Francesco Ricci, Paul B. Kantor, "Recommender Systems Handbook",Springer US, 2011.	

Course Contents and Lecture Schedule

S. No.	Topic	No. of Hours
1	**Introduction**	
1.1	Overview of Information Retrieval	1
1.2	Retrieval Models	1
1.3	Search and Filtering Techniques	1
1.4	Recommender system functions	1
1.5	Matrix operations	1
1.6	covariance matrices	1
1.7	Understanding ratings	1
1.8	Applications of recommendation systems	1
1.9	Issues with recommender system.	1
2	**Content-based Filtering**	
2.1	High level architecture of content-based systems	1
2.2	Advantages and drawbacks of content based filtering	1
2.3	Discovering features of documents, pre-processing and feature extraction	1
2.4	Methods for learning user profiles, Similarity based retrieval	1
2.5	User-based recommendation	1
2.6	Item-based recommendation	1
2.7	Model based approaches	1
2.8	Matrix factorization	1
2.9	Attacks on collaborative recommender systems	1
3	**Hybrid Approaches**	
3.1	Opportunities for hybridization	1
3.2	Monolithic hybridization design	1

3.3	Feature combination	1
3.4	Feature augmentation	1
3.5	Parallelized hybridization design	1
3.6	Weighted, Switching	1
3.7	Mixed, Pipelined hybridization design	1
3.8	Cascade Meta- level	1
3.9	Limitations of hybridization strategies	1
4	**Evaluating Recommender System**	
4.1	Introduction	1
4.2	General properties of evaluation research	1
4.3	Evaluation designs: Accuracy	1
4.4	Coverage, confidence	1
4.5	Novelty, Diversity	1
4.6	Scalability	1
4.7	Serendipity	1
4.8	Evaluation on historical datasets	1
4.9	Offline evaluations	1
5	**Types of Recommender Systems**	
5.1	Recommender systems in personalized web search	2
5.2	Types of Recommender systems	1
5.3	Knowledge-based recommender system	2
5.4	Social tagging recommender systems	2
5.5	Trust-centric recommendations	1
5.6	Group recommender systems.	1
	Total	**45**

Course Designers

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

60 PCS E64	**Virtualization Techniques**	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To understand the concepts of virtualization and virtual machines.
- To understand the implementation of process and system virtual machines.
- To explore the aspects of high level language virtual machines.
- To gain expertise in server, network and storage virtualization.
- To understand and deploy practical virtualization solutions and enterprise solutions.

Prerequisite

NIL

Course Outcomes

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

CO1	Classify Virtual Machines.	Remember
CO2	Deploy legacy OS on virtual machines.	Understand
CO3	Analyze the intricacies of server, storage and network virtualizations.	Analyze
CO4	Design and develop applications on virtual machine platforms.	Understand, Apply
CO5	Suggest appropriate high level language virtual machine for the problem in hand.	Understand, Apply, Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	2	2	2
CO2	3	2	3	2	2	1
CO3	3	2	2	2	2	2
CO4	3	2	2	2	2	2
CO5	3	2	2	2	2	2
3 – Strong; 2 – Medium; 1 – Some						

Assessment Pattern

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

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60 PCS E64 – Virtualization Techniques								
M.E. Computer Science and Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

OVERVIEW OF VIRTUALIZATION System Architectures - Virtual Machine Basics - Process vs System Virtual Machines - Taxonomy. Emulation: Basic Interpretation - Threaded Interpretation - Precoded and Direct Threaded Interpretation - Binary Translation. System Virtual Machines - Key Concepts - Resource utilization basics.	[9]
PROCESS VIRTUAL MACHINES Implementation – Compatibility – Levels – Framework – State Mapping – Register – Memory Address Space – Memory Architecture Emulation – Memory Protection – Instruction Emulation – Performance Tradeoff - Staged Emulation – Exception Emulation – Exception Detection – Interrupt Handling – Operating Systems Emulation – Same OS Emulation – Different OS Emulation – System Environment.	[9]

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HIGH LEVEL LANGUAGE VIRTUAL MACHINES AND SERVER VIRTUALIZATION HLL Virtual Machines: Pascal P-Code – Object Oriented HLLVMs - Java VM architecture - Java Native Interface - Common Language Infrastructure. Server virtualization: Partitioning techniques - virtual hardware - uses of virtual servers - server virtualization platforms	[9]
NETWORK AND STORAGE VIRTUALIZATION Design of Scalable Enterprise Networks – Layer2 Virtualization – VLAN - VFI - Layer 3 Virtualization – VRF - Virtual Firewall Contexts - Network Device Virtualization - Data- Path Virtualization - Routing Protocols. Hardware Devices – SAN backup and recovery techniques – RAID – Classical Storage Model – SNIA Shared Storage Model – Virtual Storage: File System Level and Block Level .	[9]
APPLYING VIRTUALIZATION Practical Virtualization Solutions: Comparison of Virtualization Technologies: Guest OS/ Host OS – Hypervisor – Emulation – Kernel Level – Shared Kernel, Enterprise Solutions: VMWare Server – VMWareESXi – Citrix Xen Server – Microsoft Virtual PC – Microsoft Hyper-V – Virtual Box, Server Virtualization: Configuring Servers with Virtualization – Adjusting and Tuning Virtual servers – VM Backup – VM Migration, Desktop Virtualization: Terminal services – Hosted Desktop – Web-based Solutions – Localized Virtual Desktops, Network and Storage Virtualization: Virtual Private Networks – Virtual LAN – SAN and VSAN – NAS	[9]
Total Hours	**45**

Text Book(s):

1.	Ricci F., Rokach L., Shapira D., Kantor B.P., “Recommender Systems Handbook”, Ist edition, Springer,2011.
2.	David Marshall, Wade A. Reynolds, “Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center”, Auerbach Publications, 2006.

Reference(s):

1.	Kumar Reddy, Victor Moreno, “Network virtualization”, Cisco Press, July, 2006.
2.	Chris Wolf, Erick M. Halter, “Virtualization: From the Desktop to the Enterprise”, A Press
3.	Kenneth Hess , Amy Newman, “Practical Virtualization Solutions: Virtualization from the Trenches”, Prentice Hall, 2010

Course Contents and Lecture Schedule

S.No.	Topic	No.of Hours
1	**OVERVIEW OF VIRTUALIZATION**	
1.1	System Architectures	1
1.2	Virtual Machine Basics - Process vs System Virtual Machines - Taxonomy	1
1.3	Emulation: Basic Interpretation	1
1.4	Threaded Interpretation	1
1.5	Precoded and Direct Threaded Interpretation	1
1.6	Binary Translation	1
1.7	System Virtual Machines	1
1.8	Key Concepts	1
1.9	Resource utilization basics	1

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2	**PROCESS VIRTUAL MACHINES**	
2.1	Implementation – Compatibility – Levels	1
2.2	Framework – State Mapping	1
2.3	Register – Memory Address Space	1
2.4	Memory Architecture Emulation, Memory Protection	1
2.5	Instruction Emulation, Performance Tradeoff	1
2.6	Staged Emulation – Exception Emulation – Exception Detection	1
2.7	Interrupt Handling	1
2.8	Operating Systems Emulation - Same OS Emulation	1
2.9	Different OS Emulation - System Environment	1
3	**HIGH LEVEL LANGUAGE VIRTUAL MACHINES AND SERVER VIRTUALIZATION**	
3.1	HLL Virtual Machines: Pascal P-Code	1
3.2	Object Oriented HLLVMs	1
3.3	Java VM architecture	1
3.4	Java Native Interface	1
3.5	Common Language Infrastructure	1
3.6	Server virtualization: Partitioning techniques	1
3.7	virtual hardware	1
3.8	uses of virtual servers - server virtualization platforms	2
4	**NETWORK AND STORAGE VIRTUALIZATION**	
4.1	Design of Scalable Enterprise Networks	1
4.2	Layer2 Virtualization	1
4.3	VLAN – VFI, Layer 3 Virtualization	1
4.4	VRF - Virtual Firewall Contexts	1
4.5	Network Device Virtualization, Data- Path Virtualization	1
4.6	Routing Protocols	1
4.7	Hardware Devices – SAN backup and recovery techniques	1
4.8	RAID – Classical Storage Model – SNIA Shared Storage Model	1
4.9	Virtual Storage: File System Level and Block Level	1
5	**APPLYING VIRTUALIZATION**	
5.1	Practical Virtualization Solutions: Comparison of Virtualization Technologies: Guest OS/ Host OS	1
5.2	Hypervisor – Emulation – Kernel Level – Shared Kernel	1
5.3	Enterprise Solutions: VMWare Server - VMWareESXi - Citrix Xen Server	1
5.4	Microsoft Virtual PC – Microsoft Hyper-V – Virtual Box	1

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5.5	Server Virtualization: Configuring Servers with Virtualization – Adjusting and Tuning Virtual servers	1
5.6	VM Backup – VM Migration	1
5.7	Desktop Virtualization: Terminal services – Hosted Desktop	1
5.8	Web-based Solutions – Localized Virtual Desktops	1
5.9	Network and Storage Virtualization: Virtual Private Networks – Virtual LAN – SAN and VSAN – NAS	1
	Total	45

Course Designers

1. Ms. M. Saradha – saradha@ksrct.ac.in

60 PCS E65	**Database Administration and Tuning**	Category	L	T	P	Credit
		PE	3	0	0	3

Objective

- To understand the tasks in database administration
- To learn the methods to secure the database and to recover from failures
- To understand the fundamentals of database tuning
- To apply indexing techniques and query optimization for database tuning
- To understand and measure performance monitors to troubleshoot the database system

Prerequisite

NIL

Course Outcomes

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

CO1	Infer multidimensional intelligent model from typical system	Analyze
CO2	Discover the knowledge imbibed in the high dimensional system and gain knowledge on data warehouse process	Understand
CO3	Acquire knowledge of data processing and data quality	Understand
CO4	Execute classification and clustering techniques	Apply
CO5	Illustrate various mining techniques on complex data objects	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	2		2	2
CO2	3	3	2		2	2
CO3	3	3	2		2	
CO4	3	3	2		2	2
CO5	3	3	2		2	2
3 – Strong; 2 – Medium; 1 – Some						

Passed in BoS Meeting held on 20/05/22
Approved in Academic Council Meeting held on 03/06/2023

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Assessment Pattern

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

K. S. Rangasamy College of Technology – Autonomous R2022								
60 PCS E65 – Database Administration and Tuning								
M.E. Computer Science and Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Introduction to Database Administration Database Administration - DBA Tasks- Database Design - Performance Monitoring and Tuning – Availability - Database Security and Authorization - Backup and Recovery - Data Integrity - DBMS Release Migration - Types of DBAs - Creating the Database Environment - Choosing a DBMS - DBMS Architectures - DBMS Clustering - DBMS Proliferation - Hardware Issues - Installing the DBMS - DBMS Installation Basics Hardware Requirements - Storage Requirements Memory Requirements Configuring the DBMS - Connecting the DBMS to Supporting Infrastructure Software - Installation Verification - DBMS Environments - Upgrading DBMS Versions and Releases - Fallback Planning - Migration Verification	[9]
Database Security, Backup and Recovery Database Users - Granting and Revoking Authority - Types of Privileges - Granting to PUBLIC- Revoking Privileges - Security Reporting - Authorization Roles and Groups - Using Views for Security - Using Stored Procedures for Security Auditing - SQL Injection Prevention - External Security - Job Scheduling and Security - Image Copy Backups - Full vs. Incremental Backups - Database Objects and Backups - DBMS Control - Concurrent Access Issues - Backup Consistency - Log Archiving and Backup - DBMS Instance Backup - Designing the DBMS Environment for Recovery - Types of Recovery - Alternatives to Backup and Recovery – DBA Tools – DBA Rules of Thumb	[9]
Fundamentals of Tuning Review of Relational Databases – Relational Algebra – Locking and Concurrency Control – Correctness Consideration – Lock Tuning – Logging and the Recovery Subsystem – Principles of Recovery – Tuning the Recovery Subsystem – Operating Systems Considerations – Hardware Tuning.	[9]
Index Tuning and Query Optimization Types of Queries – Data Structures – B tree – B+ Tree - Hash Structures – Bit Map Indexes – Clustering Indexes – Non Clustering Indexes – Composite Indexes – Hot Tables – Comparison of Indexing and Hashing Techniques-Optimization Techniques - Tuning Relational Systems –- Normalization – Tuning Denormalization – Clustering Two Tables – Aggregate Maintenance – Record Layout – Query Cache – Parameter Cache - Query Tuning – Triggers – Client Server Mechanisms – Objects, Application Tools and Performance –Tuning the Application Interface – Bulk Loading Data – Accessing Multiple Databases.	[9]
Troubleshooting Query Plan Explainers – Performance Monitors – Event Monitors.-Finding 'Suspicious' Queries – Analyzing Query's Access Plan – Profiling Query Execution-Tuning DBMS Subsystems - Disk Subsystem - Buffer Manager - Logging Subsystem - Locking Subsystem-Troubleshooting CPU, Disks and Controllers, Memory, and Networks.	[9]

Passed in BoS Meeting held on 20/05/22
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	Total Hours	**45**
Text Book(s):		
1.	Craig S. Mullins, "Database Administration: The Complete Guide to Practices and Procedures", Addison-Wesley Professional, 2nd edition, 2013.	
2.	Dennis Shasha and Philippe Bonnet, "Database Tuning, Principles, Experiments and Troubleshooting Techniques", Elsevier Reprint, 2005.	
Reference(s):		
1.	Silberschatz, Korth, "Database System Concepts", McGraw Hill, 6th edition, 2010.	
2.	Thomas Connoly and CarlolynBegg, "Database Systems, A Practical Approach to Design,	

Course Contents and Lecture Schedule

S.No.	Topic	No.of Hours
1	**Spatial Domain Processing**	
1.1	Database Administration - DBA Tasks- Database Design - Performance Monitoring and Tuning	1
1.2	Availability - Database Security and Authorization - Backup and Recovery	1
1.3	Data Integrity - DBMS Release Migration - Types of DBAs	1
1.4	Creating the Database Environment - Choosing a DBMS - DBMS Architectures	1
1.5	DBMS Clustering - DBMS Proliferation - Hardware Issues	1
1.6	Installing the DBMS - DBMS Installation Basics Hardware Requirements - Storage Requirements Memory Requirements Configuring the DBMS	1
1.7	Connecting the DBMS to Supporting Infrastructure Software - Installation Verification	1
1.8	DBMS Environments - Upgrading DBMS Versions and Releases	1
1.9	Fallback Planning - Migration Verification	1
2	**Frequency Domain Processing**	
2.1	Database Users - Granting and Revoking Authority - Types of Privileges	1
2.2	Granting to PUBLIC- Revoking Privileges - Security Reporting	1
2.3	Authorization Roles and Groups - Using Views for Security - Using Stored Procedures for Security Auditing	1
2.4	SQL Injection Prevention - External Security - Job Scheduling and Security	1
2.5	Image Copy Backups - Full vs. Incremental Backups - Database Objects and Backups	1
2.6	DBMS Control - Concurrent Access Issues	1
2.7	Backup Consistency - Log Archiving and Backup - DBMS Instance Backup	1
2.8	Designing the DBMS Environment for Recovery - Types of Recovery - Alternatives to Backup and Recovery	1
2.9	DBA Tools – DBA Rules of Thumb	1

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3	**Segmentation and Edge Detection**	
3.1	Review of Relational Databases – Relational Algebra	1
3.2	Locking and Concurrency Control	1
3.3	Correctness Consideration	1
3.4	Lock Tuning	1
3.5	Logging and the Recovery Subsystem	1
3.6	Principles of Recovery	1
3.7	Tuning the Recovery Subsystem	1
3.8	Operating Systems Considerations	1
3.9	Hardware Tuning.	
4	**Interest Points, Morphology, and Texture**	
4.1	Types of Queries – Data Structures – B tree	1
4.2	B+ Tree - Hash Structures – Bit Map Indexes	1
4.3	Clustering Indexes – Non clustering Indexes – Composite Indexes	1
4.4	Hot Tables – Comparison of Indexing and Hashing Techniques- Optimization Techniques	1
4.5	Tuning Relational Systems –- Normalization – Tuning Denormalization	1
4.6	Clustering Two Tables – Aggregate Maintenance – Record Layout	1
4.7	Query Cache – Parameter Cache - Query Tuning – Triggers	1
4.8	Client Server Mechanisms – Objects, Application Tools and Performance	1
4.9	Tuning the Application Interface – Bulk Loading Data – Accessing Multiple Databases.	
5	**Color Images and Image Compression**	
5.1	Query Plan Explainers – Performance Monitors	1
5.2	Event Monitors	1
5.3	Finding 'Suspicious' Queries	1
5.4	Analyzing Query's Access Plan	1
5.5	Profiling Query Execution	1
5.6	Tuning DBMS Subsystems	1
5.7	Disk Subsystem	1
5.8	Buffer Manager - Logging Subsystem- Locking Subsystem	1
5.9	Troubleshooting CPU, Disks and Controllers, Memory, and Networks.	1
	Total	45

Course Designers

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