K.S. Rangasamy College of Technology

(Autonomous)

Curriculum & Syllabi

of

B.E. Computer Science and Engineering

(For the batch 2019 – 23)

R 2018

Courses Accredited by NBA, Accredited by NAAC "A++" Grade, Approved by AICTE, Affiliated to Anna University, Chennai.

KSR Kalvi Nagar, Tiruchengode – 637 215.

Namakkal District, Tamil Nadu, India.

VISION

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

MISSION

- To produce competent software developers, system designers and network programmers.

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

PO2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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

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

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

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

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

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

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

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

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

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

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

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

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

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

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

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PEO 3	3	2	3	2	2	1	1	1	3	2	3	1	

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

MAPPING-UG-COMPUTER SCIENCE AND ENGINEERING

Year	Sem	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I	I	Communication Skills I					2			2.0	2.8	3.0	2.0	2.8
		Calculus and Differential Equations	3.0	3.0	2.8	2.4	2.4							2.0
		Applied Chemistry	2.4	2.0	2.5	2.6	2.2	2.3	2.0	1.0		1.0		1.0
		Engineering Mechanics	3.0	2.0	2.0	3.0								2.0
		Programming for Problem Solving	3.0	2.0	3.0		3.0				3.0	3.0	2.0	2.0
		Chemistry Laboratory	2.8	2.8	2.8	2.4		1.0	1.5		3.0	1.0		2.0
		Programming for Problem solving Laboratory	3.0	2.0	3.0		3.0				3.0	3.0	2.0	2.0
I	II	Communication Skills II					2.0			2.0	3.0	3.0	2.4	3.0
		Laplace Transform and Complex Variables	3.0	3.0	2.4	2.2	2.8							2.0
		Semiconductor Optoelectronics	3.0	3.0	2.8	2.6	2.8	2.0	2.6			2.0		3.0
		Basic Electrical Engineering	3.0	3.0	1.7	1.5	2.0	2.0	2.0	2.0	1.7	2.0	2.3	1.5
		Engineering Graphics	3.0	2.6	3.0	3.0	3.0	1.0	1.0	1.0		3.0	1.4	1.4
		Essence of Indian Traditional Knowledge					3	3		3	2			3
		Applied Physics Laboratory	3.0	2.6	2.2	2.2					3.0	3.0		2.0
		Engineering Practices Laboratory	3.0	2.0	2.0	1.0	3.0	2.0	2.0	3.0	1.0	2.0	2.0	1.0
II	III	Probability and Statistics	3.0	2.6	3.0	2.4	2.6	3.0					3.0	2.6
		Data Structures	3.0	3.0	2.0	2.6	2.0	2.0	2.0	1.8	2.6	2.0		2.0
		Object Oriented Programming	3.0	2.0	3.0		3.0				3.0	3.0	2.0	2.0
		Digital Logic Circuits	2.8	2.8	3.0	2.4	2.8							
		Software Engineering	3.0	3.0	2.8	2.5	3.0		2.0	2.0	2.0	2.0	2.8	2.0
		Environmental Science	2.6	2.4	2.6	2.6	2.2	2.8	3.0	3.0	2.8	2.8	2.5	2.0
		Data Structures Laboratory	3.0	3.0	2.0	2.7	2.0	2.0	2.0	3.0	2.6	2.0		2.0
		Object Oriented Programming Laboratory	3.0	2.0	3.0		3.0				3.0	3.0	2.0	2.0
		Career Competency Development I						2.0		2.0	3.0	3.0		3.0

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II	IV	Discrete Mathematics	3.0	3.0	2.0	2.6	2.2							2.4

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Design and Analysis of Algorithms	3.0	3.0	3.0	2.4	3.0							2.0

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		Java Programming	2.6	3.0	3.0	2.0	3.0	2.0		2.0	3.0	3.0	2.0	3.0
		Operating Systems	3.0	2.6	2.8	3.0			2.0			2.0		2.2
		Computer Architecture	2.6	2.4	2.0		2.0					2.0		2.0
		Open Elective- I												
		Java Programming laboratory	2.6	3.0	3.0	2.0	3.0	2.0		2.0	3.0	3.0	2.0	3.0
		Operating Systems Laboratory	3.0	2.6	2.8	3.0			2.0		2.0	2.0		2.2
		Career Competency Development II	1.2	0.8	0.8	0.8			0.4		2.8	3.0		3.0
III	V	Computer Networks	2.8	2.6	2.8		2.3		2.0	2.5	2.5	2.5		2.0
		Database Management Systems	3.0	3.0	2.0		2.0	2.0	2.0		3.0			2.0
		Formal Language and Automata Theory	3.0	2.8	2.0	2.0				1.7		1.5	2.0	2.0
		Web Technology	3.0	2.0	3.0	-	3.0				3.0	3.0	2.0	3.0
		Elective - I												
		Open Elective – II												
		Networking Laboratory	3.0	3.0	3.0	2.4	2.2				2.0	2.0		2.6
		Database Management Systems Laboratory	3.0	3.0	3.0	-	3.0	2.0	2.0		3.0	3.0		3.0
		Career Competency Development III	3.0	2.0	2.0	2.0	3.0	2.0	1.0	2.0	3.0	2.8	2.5	3.0
III	VI	Python Programming	3.0	2.8	3.0		3.0	2.0	2.0		3.0	3.0		3.0
		Principles of Compiler Design	2.0	3.0	3.0		2.0		2.0			2.0		2.0
		Software Testing	3.0	2.6	2.8	3.0	3.0		2.0	2.5		2.0		3.0
		Elective – II												
		Elective – III												
		Open Elective- III												
		Start-ups and Entrepreneurship	2.8	2.6	3	2.4	2.2	2.5	1.6	1.7	1.3	2	2.2	2.4
		Python Programming Laboratory	3.0	2.8	3.0		3.0	2.0	2.0		3.0	3.0	2.0	3.0
		Open Source Systems Laboratory	3.0	2.0	3.0	2.0	3.0	2.0	2.0	3.0	3.0	2.0		3.0
		Career Competency Development IV	3.0	2.3	2.0	2.3	2.5	1.5	1.0	2.0	3.0	2.6	2.7	3.0
IV	VII	Engineering Economics and Financial Accounting	2.6	1.8	2.8	1.6	1.4	2.4	2.0	1.4	2.2	1.8	2.6	1.4
		Data Science	2.6	3.0	3.0	2.5	2.8	3.0	3.0		2.0		2.0	1.8
		Mobile Computing	3.0	2.6	2.6	2.0	2.0			3.0		2.0		2.0
		Cloud Computing	3.0	2.6	2.6	2.0	2.0				3.0	2.0		2.0
		Elective – IV												
		Open Elective – IV												
		Research Skill Development -I	3.0	3.0	2.0	2.2	2.0	2.0	1.5	2.0	1.8	3.0	2.3	1.5
		Cloud Computing Laboratory	3.0	2.6	2.6		3.0	2.0	2.0	2.0	3.0	2.0	3.0	2.0
		Project Work Phase-I	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
		Career Competency Development V	3.0	2.3	2.0	2.3	2.5	1.5	1.0	2.0	3.0	2.6	2.7	3.0

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IV	VIII	Elective V												

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Ethics for Engineers	2.6	1.8	2.8	1.6	1.4	2.4	2	1.4	2.2	1.8	2.6	1.4
Research Skill Development -II	3.0	3.0	2.8	2.7	2.7	2.0	1.8	2.3	1.8	2.0	2.0	1.4
Project Work Phase-II	3	3	3	3	3	3	3	3	3	3	3	3

SEMESTER I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	50 EN 001	Communication Skills I	HS	2	1	1	0	2
2.	50 MA 001	Calculus and Differential Equations	BS	4	3	1	0	4
3.	50 CH 001	Applied Chemistry	BS	3	3	0	0	3
4.	50 ME 003	Engineering Mechanics	ES	4	3	1	0	4
5.	50 CS 001	Programming for Problem Solving	ES	3	3	0	0	3
PRACTICALS								
6.	50 CH 0P1	Chemistry Laboratory	BS	4	0	0	4	2
7.	50 CS 0P1	Programming for Problem solving Laboratory	ES	4	0	0	4	2
			Total	**24**	**13**	**3**	**8**	**20**

SEMESTER II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	50 EN 002	Communication Skills II	HS	2	1	1	0	2
2.	50 MA 002	Laplace Transform and Complex Variables	BS	4	3	1	0	4
3.	50 PH 003	Semiconductor Optoelectronics	BS	3	3	0	0	3
4.	50 EE 001	Basic Electrical Engineering	ES	3	3	0	0	3
5.	50 ME 002	Engineering Graphics	ES	6	2	0	4	4
6.	50 MY 006	Essence of Indian Traditional Knowledge	MC	2	2	0	0	0
PRACTICALS								
7.	50 PH 0P2	Applied Physics Laboratory	BS	4	0	0	4	2
8.	50 ME 0P1	Engineering Practices Laboratory	ES	4	0	0	4	2
			Total	**28**	**14**	**2**	**12**	**20**

SEMESTER III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	50 MA 005	Probability and Statistics	BS	4	3	1	0	4
2.	50 CS 002	Data Structures	PC	3	3	0	0	3
3.	50 CS 003	Object Oriented Programming	PC	3	3	0	0	3
4.	50 EC 002	Digital Logic Circuits	ES	6	3	1	2	5
5.	50 CS 301	Software Engineering	PC	3	3	0	0	3
6.	50 MY 002	Environmental Science	MC	2	2	0	0	0
PRACTICALS								

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7.	50 CS 0P2	Data Structures Laboratory	PC	4	0	0	4	2
8.	50 CS 0P3	Object Oriented Programming Laboratory	PC	4	0	0	4	2
9.	50 TP 0P1	Career Competency Development I	EEC	2	0	0	2	0
			Total	**31**	**17**	**2**	**12**	**22**

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SEMESTER IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
		THEORY						
1.	50 MA 011	Discrete Mathematics	BS	4	3	1	0	4
2.	50 IT 001	Design and Analysis of Algorithms	PC	3	3	0	0	3
3.	50 CS 401	Java Programming	PC	3	3	0	0	3
4.	50 CS 402	Operating Systems	PC	3	3	0	0	3
5.	50 CS 403	Computer Architecture	PC	3	3	0	0	3
6.	50 … L**	Open Elective- I	OE	3	3	0	0	3
		PRACTICALS						
7.	50 CS 4P1	Java Programming laboratory	PC	4	0	0	4	2
8.	50 CS 4P2	Operating Systems Laboratory	PC	4	0	0	4	2
9.	50 TP 0P2	Career Competency Development II	EEC	2	0	0	2	0
			Total	**29**	**18**	**1**	**10**	**23**

SEMESTER V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
		THEORY						
1.	50 CS 501	Computer Networks	PC	3	3	0	0	3
2.	50 CS 502	Database Management Systems	PC	3	3	0	0	3
3.	50 CS 503	Formal Language and Automata Theory	PC	4	3	1	0	4
4.	50 CS 504	Web Technology	PC	5	3	0	2	4
5.	50 CS E1*	Elective – I	PE	3	3	0	0	3
6.	50 … L**	Open Elective – II	OE	3	3	0	0	3
		PRACTICALS						
7.	50 CS 5P1	Networking Laboratory	PC	4	0	0	4	2
8.	50 CS 5P2	Database Management Systems Laboratory	PC	4	0	0	4	2
9.	50 TP 0P3	Career Competency Development III	EEC	2	0	0	2	0
			Total	**31**	**18**	**1**	**12**	**24**

SEMESTER VI

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
		THEORY						
1.	50 CS 601	Python Programming	PC	3	3	0	0	3

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2.	50 CS 602	Principles of Compiler Design	PC	4	3	1	0	4
3.	51 CS 603	Software Testing	PC	3	3	0	0	3
4.	50 CS E2*	Elective – II	PE	3	3	0	0	3
5.	50 CS E3*	Elective – III	PE	3	3	0	0	3
6.	50 … L**	Open Elective- III	OE	3	3	0	0	3
7.	50 MY 014	Start-ups and Entrepreneurship	MC	2	2	0	0	0
PRACTICALS								
8.	50 CS 6P1	Python Programming Laboratory	PC	4	0	0	4	2
9.	51 CS 6P2	Open Source Systems Laboratory	PC	4	0	0	4	2
10.	50 TP 0P4	Career Competency Development IV	EEC	2	0	0	2	0
			Total	**31**	**20**	**1**	**10**	**23**

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SEMESTER VII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	50 HS 001	Engineering Economics and Financial Accounting	HS	3	3	0	0	3
2.	50 CS 701	Data Science	PC	5	3	0	2	4
3.	50 CS 702	Mobile Computing	PC	3	3	0	0	3
4.	50 CS703	Cloud Computing	PC	3	3	0	0	3
5.	50 CS E4*	Elective – IV	PE	3	3	0	0	3
6.	50 … L**	Open Elective – IV	PE	3	3	0	0	3
7.	50 AC 001	Research Skill Development -I	AC	1	1	0	0	0
PRACTICALS								
8.	50 CS 7P1	Cloud Computing Laboratory	PC	4	0	0	4	2
9.	50 CS 7P2	Project Work Phase-I	EEC	4	0	0	4	2
10.	50 TP 0P5	Career Competency Development V	EEC	2	0	0	2	0
			Total	**31**	**19**	**0**	**12**	**23**

SEMESTER VIII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	50 CS E5*	Elective V	PE	3	3	0	0	3
2.	50 MY 003	Ethics for Engineers	MC	2	2	0	0	0
3.	50 AC 002	Research Skill Development -II	AC	1	1	0	0	0
PRACTICALS								
4.	50 CS 8P1	Project Work Phase-II	EEC	16	0	0	16	8
			Total	**22**	**6**	**0**	**16**	**11**

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 166

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Note: HS- Humanities and Social Sciences including Management Courses, BS- Basic Science Courses, ES- Engineering Science Courses, PC-Professional Core Courses, PE-Professional Elective Courses, OE- Open Elective Courses, EEC-Employability Enhancement Courses, MC- Mandatory Courses and AC- Audit Courses

HUMANITIES AND SOCIAL SCIENCES (HS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 EN 001	Communication Skills I	HS	3	1	1	0	2
2.	50 EN 002	Communication Skills II	HS	3	1	1	0	2
3.	50 HS 001	Engineering Economics and Financial Accounting	HS	3	3	0	0	3

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BASIC SCIENCE (BS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 MA 001	Calculus and Differential Equations	BS	4	3	1	0	4
2.	50 CH 001	Applied Chemistry	BS	3	3	0	0	3
3.	50 CH 0P1	Chemistry Laboratory	BS	4	0	0	4	2
4.	50 MA 002	Laplace Transform and Complex Variables	BS	4	3	1	0	4
5.	50 PH 003	Semiconductor Optoelectronics	BS	3	3	0	0	3
6.	50 PH 0P2	Applied Physics Laboratory	BS	4	0	0	4	2
7.	50 MA 005	Probability and Statistics	BS	4	3	1	0	4
8.	50 MA 011	Discrete Mathematics	BS	4	3	1	0	4

ENGINEERING SCIENCES (ES)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 CS 001	Programming for Problem Solving	ES	3	3	0	0	3
2.	50 ME 002	Engineering Graphics	ES	6	2	0	4	4
3.	50CS0P1	Programming for Problem solving Laboratory	ES	4	0	0	4	2
4.	50 EE 001	Basic Electrical Engineering	ES	3	3	0	0	3
5.	50 ME 003	Engineering Mechanics	ES	4	3	1	0	4
6.	50 ME0P1	Engineering Practices Laboratory	ES	4	0	0	4	2
7.	50 EC 002	Digital Logic Circuits	ES	6	3	1	2	5

PROFESSIONAL CORE (PC)

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S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 CS 002	Data Structures	PC	3	3	0	0	3
2.	50 CS 003	Object Oriented Programming	PC	3	3	0	0	3
3.	50 CS 301	Software Engineering	PC	3	3	0	0	3
4.	50 CS 0P2	Data Structures Laboratory	PC	4	0	0	4	2
5.	50 CS 0P3	Object Oriented Programming Laboratory	PC	4	0	0	4	2
6.	50 IT 001	Design and Analysis of Algorithms	PC	3	3	0	0	3
7.	50 CS 401	Java Programming	PC	3	3	0	0	3
8.	50 CS 402	Operating Systems	PC	3	3	0	0	3
9.	50 CS 403	Computer Architecture	PC	3	3	0	0	3
10.	50 CS 4P1	Java Programming laboratory	PC	4	0	0	4	2
11.	50 CS 4P2	Operating Systems Laboratory	PC	4	0	0	4	2

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12.	50 CS 501	Computer Networks	PC	3	3	0	0	3
13.	50 CS 502	Database Management Systems	PC	3	3	0	0	3
14.	50 CS 503	Formal Language and Automata Theory	PC	4	3	1	0	4
15.	50 CS 504	Web Technology	PC	5	3	0	2	4
16.	50 CS 5P1	Networking Laboratory	PC	4	0	0	4	2
17.	50 CS 5P2	Database Management Laboratory	PC	4	0	0	4	2
18.	50 CS 601	Python Programming	PC	3	3	0	0	3
19.	50 CS 602	Principles of Compiler Design	PC	4	3	1	0	4
20.	51 CS 603	Software Testing	PC	3	3	0	0	3
21.	50 CS 6P1	Python Programming Laboratory	PC	4	0	0	4	2
22.	51 CS 6P2	Open Source Systems Laboratory	PC	4	0	0	4	2
23.	50 CS 701	Data Science	PC	5	3	0	2	4
24.	50 CS 702	Mobile Computing	PC	3	3	0	0	3
25.	50 CS 703	Cloud Computing	PC	3	3	0	0	3
26.	50 CS 7P1	Cloud Computing Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE)

SEMESTER V, ELECTIVE I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	51 CS E11	Node.js and React.js	PE	4	2	0	2	3
2.	51 CS E12	C# and .NET Core	PE	4	2	0	2	3
3.	51 CS E13	R programming	PE	4	2	0	2	3
4.	51 CS E14	PHP Programming	PE	4	2	0	2	3
5.	50 CS E15	Parallel and Distributed Computing	PE	3	3	0	0	3

SEMESTER VI, ELECTIVE II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	51 CS E21	Cryptography and Network Security	PE	4	2	0	2	3
2.	51 CS E22	Mobile Application Development	PE	4	2	0	2	3
3.	51 CS E23	Scripting Languages	PE	4	2	0	2	3
4.	51 CS E24	User Interface Technologies	PE	4	2	0	2	3

Passed in BoS Meeting held on 22/12/2022
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5.	50 CS E25	High Speed Networks	PE	3	3	0	0	3

SEMESTER VI, ELECTIVE III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	51 CS E31	Artificial Intelligence	PE	4	2	0	2	3
2.	51 CS E32	Semantic Web	PE	4	2	0	2	3
3.	51 CS E33	Big Data Security	PE	4	2	0	2	3
4.	50 CS E34	Xml and Web Services	PE	3	3	0	0	3
5.	50 CS E35	Information Storage and Management	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 CS E41	Mobile Ad hoc Networks	PE	4	2	0	2	3
2.	50 CS E42	Agile Methodology	PE	4	2	0	2	3
3.	50 CS E43	Software Forensics	PE	4	2	0	2	3
4.	50 CS E44	Multimedia Computing	PE	3	3	0	0	3
5.	50 CS E45	Soft Computing	PE	3	3	0	0	3
6.	50 CS E46	Professional Readiness for Innovation, Employability and Entrepreneurship	PE	6	0	0	6	3

SEMESTER VIII, ELECTIVE V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 CS E51	Machine Learning	PE	4	2	0	2	3
2.	50 CS E52	Foundations of Block Chain Technology	PE	4	2	0	2	3
3.	50 CS E53	Text Mining	PE	4	2	0	2	3
4.	50 CS E54	Cyber Security	PE	4	2	0	2	3
5.	50 CS E55	Social Network Analysis	PE	3	3	0	0	3

SEMESTER VII & SEMESTER VIII, AUDIT COURSES (AC)

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S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 AC 001	Research Skill Development -I	AC	1	1	0	0	0
2.	50 AC 002	Research Skill Development -II	AC	1	1	0	0	0

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

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	51 CS L01	Object Oriented Programming	OE	4	2	0	2	3
2.	51 CS L02	Angular JS	OE	4	2	0	2	3
3.	51 CS L03/ 51 CS E12	C# and .NET Core	OE	4	2	0	2	3
4.	51 CS L04	Network Setup and Administration	OE	4	2	0	2	3
5.	51 CS L05	Data Mining	OE	4	2	0	2	3
6.	51 CS E13 /51 CS L06	R Programming	OE	4	2	0	2	3
7.	51 CS L07/ 51 CS E31	Artificial Intelligence	OE	4	2	0	2	3
8.	51 CS L08	Python Programming for Data Analytics	OE	4	2	0	2	3
9.	50 CS L09	Java Programming	OE	4	2	0	2	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 TP 0P1	Career Competency Development I	EEC	2	2	0	0	-
2.	50 TP 0P2	Career Competency Development II	EEC	2	2	0	0	-
3.	50 TP 0P3	Career Competency Development III	EEC	2	2	0	0	-
4.	50 TP 0P4	Career Competency Development IV	EEC	2	2	0	0	-
5.	50 TP 0P5	Career Competency Development V	EEC	2	2	0	0	-
6.	50 CS 7P2	Project Work Phase-I	EEC	4	0	0	4	2
7.	50 CS 8P1	Project Work Phase-II	EEC	16	0	0	16	8

SUMMARY

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S.No.	Category	Credits Per Semester								Total Credits	Percentage %
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	2	2	-	-	-	-	3	-	**07**	**4.1**
2.	BS	9	9	4	4	-	-	-	-	**26**	**15.1**
3.	ES	9	9	5	-	-	-	-	-	**23**	**13.4**
4.	PC	-	-	13	16	18	14	12	-	**73**	**42.4**
5.	PE	-	-	-	-	3	6	3	3	**15**	**8.7**
6.	OE	-	-	-	3	3	3	3	-	**12**	**7.0**
7.	EEC	-	-	-	-	-	-	2	8	**10**	**9.3**
8.	MC	-	MC I	MC II	MC III	-	MC IV	-	-	**-**	**-**
9.	AC	-	-	-	-	-	-	AC I	AC II	**-**	**-**
Total		**20**	**20**	**22**	**23**	**24**	**23**	**23**	**11**	**166**	**100**

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K.S.Rangasamy College of Technology – Autonomous R2018

50 EN 001 – Communication Skills I

Common to all Branches

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	1	1	0	30	2	50	50	100

Objective(s)	• To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts. • To help learners develop strategies that could be adopted while reading texts. • To help learners acquire the ability to speak effectively in English in real life and career related situations. • To equip students with effective speaking and listening skills in English. • To facilitate learners to enhance their writing skills with coherence and appropriate format effectively
Course Outcomes	**At the end of the course the students will be able to** 1. Utilize digital literacy tools to develop listening skills & make use of contextual clues to infer meanings of unfamiliar words 2. Able to select, compile & synthesize information using communication strategies for an effective oral presentation 3. Skim & Scan the textual content & infer meanings of unfamiliar words to develop reading & vocabulary skills 4. Generate ideas from sources to develop coherent content and support with relevant details in writing 5. Recognize the basic phonetic patterns of language & execute it for competent loud reading

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Listening

Listening to Short Audios – Watching Short Videos - answering MCQs and Vocabulary Check- Listening to Short Comprehension Passages – Guided Listening – Listening to songs and cognizing the lyrics **[10] Speaking**

Brainstorming – Group Discussion (unstructured) – Self Introduction - Just a Minute (JaM) - Short Narratives – Cue Cards – Picture Cards – Conversational Practices (Preliminary) **[15]**

Reading

Silent Reading – Scanning and Skimming - Reading short and Medium Passages – Cognition of Theme and Inferential Meaning - Academic and Functional Vocabulary List (350 words) – Word Power Check - Loud Reading – Modulation and Pronunciation Check [**10]**

Writing

Functional Vocabulary and Word Power – Data Interpretation - Paragraph Writing – Letter Writing –Email Writing – Conversational Fill Ups **[10]**

Total Hours : 15+15(Tutorial)=30 hours

Text Books

1. M.Ashraf Rizvi, '*Effective Technical Communication*', 2nd Edition, McGraw Hill Education (India) Private Limited, Chennai, 2018
2. Norman Lewis, '*Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book*', Penguin Random House India, 2020

References Books and Sites:

1. Paul Emmerson and Nick Hamilton , *'Five Minute Activities for Business English',* Cambridge University Press, N.York, 2005

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2.	Arthur Brookes and Peter Grundy ,' *Beginning to Write: Writing Activities for Elementary and Intermediate Learners',* Cambridge University Press, N.York, 2003
3.	Michael McCarthy and Felicity O Dell , *'English Vocabulary in Use: Upper Intermediate',* Cambridge University Press, N.York, 2012
4.	https://learningenglish.britishcouncil.org/en/listening

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					2			2	3	3	2	3	2	2
2								2	3	3	2	3	2	2
3					2			2	3	3	2	3	2	2
4					2			2	3	3	2	3	2	2
5								2	2	3	2	2	1	1

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K.S.Rangasamy College of Technology – Autonomous R2018								
50 MA 001 - Calculus and Differential Equations								
Common to All Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	1	0	60	4	50	50	100

Objective(s)	• To familiarize the students with the basic concepts in Cayley - Hamilton theorem and Orthogonal transformation. • To get exposed to the fundamentals in circle of curvature, evolute and envelope of the curves. • To acquire skills to understand the concepts involved in Jacobians and maxima and minima. • To solve various linear differential equations and simultaneous differential equations. • To learn various techniques and methods in solving definite and indefinite integrals.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Apply Cayley - Hamilton theorem and to reduce quadratic form into canonical form. CO2: Compute the equation of the circle of curvature, evolute and envelope of the curves. CO3: Analyze Jacobian methods and constrained maxima and minima functions. CO4: Apply various methods in differential equations to solve linear and simultaneous differential equations. CO5: Evaluate definite and indefinite integrals using different techniques.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Matrices

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors – Cayley-Hamilton theorem (without proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation - Nature of quadratic form. [8]

Differential Calculus

Curvature – radius of curvature (Cartesian and polar co-ordinates) – Centre of curvature – Circle of curvature – Involute and evolute – envelope. [9]

Functions of Several Variables

Partial differentiation – Homogeneous functions and Euler's theorem – Jacobians – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Constrained maxima and minima : Lagrange's Method of Undetermined Multipliers.
[9]

Differential Equations

Linear differential equations of second and higher order with constant co-efficient - R.H.S is $e^{\square x}$, $\sin \square x$, $\cos \square x$, x^n $n \square 0$, $e^{\square x} \sin \square x$, $e^{\square x} \cos \square x$, $e^{\square x} x^n$, $x^n \sin \square x$ **and** $x^n \cos \square x$ – Differential equations with variable co-efficients : Cauchy's and Legendre's form of linear equation – Method of variation of parameters– Simultaneous first-order linearequations with constantco-efficients. [9] **Integral Calculus**

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.
[10]

Total Hours: 45 + 15(Tutorial) = 60 hours

Text book:

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1	B. S. Grewal, “Higher Engineering Mathematics”, 43rd Edition, Khanna Publishers, Delhi, 2014. Web site: https://pvpsitrealm.blogspot.com/2016/09/higher-engineering-mathematics-by-bs.html
2	T. Veerarajan., “Engineering Mathematics”, for Semesters I and II , Tata McGraw Hill Publishing Co., New Delhi., 2010.
Reference(s):	
1	Kreyszig Erwin, “Advanced Engineering Mathematics”, 10th Edition, John Wiley and Sons (Asia)Limited, New Delhi, 2016
2	Dr. P.N. Agrawal and Dr.D.N. Pandey,” Integral Equations,calculus of variations and its applications”, NPTEL online video courses.
3	Dr.S. K.Gupta and Dr. Sanjeev Kumar, “Matrix Analysis with Applications” and Prof Somnath Roy “Matrix Solvers” , NPTEL online video courses.
4	Dr. P.Kandasamy , Dr.K.Thilagavathy and Dr. K.Gunavathy , “Engineering Mathematics-II”,S.Chand & Company Ltd, New Delhi.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	3							2	3	
2	3	3	2	2	2							2	3	2
3	3	3	3	2	2							2	3	2
4	3	3	3	3	2							2	3	2
5	3	3	3	2	3							2	3	2

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K.S.Rangasamy College of Technology – Autonomous R2018								
50 CH 001 - Applied Chemistry								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	50	50	100
Objective(s)	• To endow with the periodic properties of elements and molecular orbitals variation of orbitals • To assist the learners to apply the thermodynamic functions to electro chemical reactions and its application • To help the learners to analyze the hardness of water and its removal techniques • To endow with various spectroscopy techniques and its applications • To facilitate the students with the basics of stereochemistry and types of chemical reactions with their mechanism							
Course Outcomes	**At the end of the course, the student will be able to:** CO1: Rationalize the periodic properties of elements and molecular orbitals variation of orbitals CO2: Apply the thermodynamic functions to electro chemical reactions and its application CO3: Analyse the cause and effects of hardness of water and its removal techniques CO4: Interpret the various spectroscopy techniques and its applications CO5: Infer the types of stereochemistry and chemical reactions with their mechanism							
Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**								

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Periodic Properties

Effective nuclear charge - atomic and ionic sizes - ionization energies - electron affinity - electronegativity - polarizability - oxidation states - penetration of orbitals- variations of s, p, d and f orbital energies of atoms - electronic configurations, ionic, dipolar and Vander- waals interactions. Hard soft acids and bases (HSAB). Molecular orbitals of diatomic molecules - plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbital of butadiene and benzene. [9] **Chemical Equilibria and Corrosion**

Thermodynamic functions - energy - entropy - enthalpy- free energy - Gibbs-Helmholtz equation - Van 't Hoff isotherm. Cell potentials - Nernst equation - applications - EMF series - applications - Poteniometric and Conductometric titrations.

Corrosion- types of corrosion - chemical and electrochemical corrosion - mechanism - Factors influencing corrosion - Corrosion control methods (impressed current and sacrificial anode methods) - Corrosion inhibitors. [9]

Water Chemistry

Sources - Water quality parameters - impurities in water and their effects. Hardness - Estimation of hardness - effect of hard water in various industries-Softening of water- zeolite process- ion-exchange process - reverse osmosis - electrodialysis. Boiler troubles - methods of prevention. [9]

Analytical Techniques and Applications

Absorption laws - Ultra violet spectroscopy (UV) - Principle - Instrumentation (Block diagram) - applications. Infra red spectroscopy (IR)- Instrumentation (Block diagram) - selection rule - types of fundamental vibrations - applications. Nuclear magnetic resonance spectroscopy (NMR) - Principle - selection rule - Instrumentation (Block diagram) - chemical shift - factors influencing the chemical shift -applications. Atomic absorption spectroscopy (AAS) - Principle - Instrumentation (Block diagram) -applications. [9] **Concepts in Organic Chemistry**

Structural isomerism- types - Stereoisomerism - geometrical (Maleic and Fumaric acids) - optical isomerism (Lactic and Tartaric acids) - symmetry - chirality- enantiomers - diastereomers - optical activity - absolute configurations. Introduction to reactions - substitution - addition - oxidation - reduction - cyclization and ring openings - mechanism. [9]

Total Hours : 45 hours

Text Book(s):

1	Jain. P.C. and Monica Jain, “Engineering Chemistry”, Dhanpatrai Publishing Co. New Delhi, 14th edition, 2015.
2	Dr. S.Vairamand Dr. Suba Ramesh, “Engineering Chemistry”, Wiley India Private Limited , 2nd edition, January 2013.

Reference(s):

1	Puri B. R., Sharma L.R., and Pathania M.S., “Principles of Physical Chemistry”, Vishal Publishing Company, Delhi, 2017.
2	Dara. S.S, “A Text Book Of Engineering Chemistry”, S Chand & Co. Ltd., 2014.
3	Bahl B.S. and Arun Bahl, “Advanced Organic Chemistry”, S.Chand, New Delhi, 2014.
4	Sharma B K. Instrumental Methods of Chemical Analysis, Goel Publishing House Meerut, 23th edition; 2014.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2			2	2									
2	3	2	2	2	2	2	2	1		1		1		2
3	3	3	2	3	2	3	2	1				1		2
4	2	2	3	3	3	2						1	2	2

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5	2	1	3	3	2	2								

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50 ME 003 – Engineering Mechanics								
Common to all branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	1	0	60	4	50	50	100
Objective(s)	• To learn a process for analysis of static objects, concepts of force, moment, and mechanical equilibrium in two and three dimensions. • To learn the equilibrium of rigid bodies such as frames, trusses, beams. • To identify the properties of surfaces and solids by using different theorem. • To impart basic concept of dynamics of particles. • To acquire the concept of friction and elements of rigid body dynamics.							
Course Outcomes	**At the end of the course, the student will be able to:** CO1: Use scalar and vector analytical techniques for analyzing forces in statically determinate structures. CO2: Apply basic knowledge of scientific concepts to solve real-world problems. CO3: Compute the properties of surfaces and solids using various theorems. CO4: Analyze and solve problems on kinematics and kinetics. CO5: Draw a shear force and bending moment diagrams, analysis of rigid body dynamics and calculation of frictional forces on contact surfaces.							
Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.								

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Basics and Statics of Particles

Introduction -Units and Dimensions-Laws of Mechanics–Principle of transmissibility-Lame's theorem, Parallelogram and triangular Law of forces–Vectors–Vectorial representation of forces and moments.

Vector Operations

Addition, subtraction, dot product, cross product-Coplanar Forces–Resolution and Composition of forces–Equilibrium of a particle–Forces in space-Equilibrium of a particle in space-Equivalent systems of forces-Single equivalent force. [12]

Equilibrium of Rigid Bodies

Free body diagram–Types of supports and their reactions–requirements of stable equilibrium–Static determinacy, Moments and Couples–Moment of a force about a point and about an axis–Vectorial representation of moments and couples–Varignon's theorem-Equilibrium of Rigid bodies in two dimensions. **Trusses**: Introduction, axial members, calculation of forces on truss members using method of joints-Method of sections. [12]

Properties of Surfaces and Solids

Determination of Areas and Volumes-Centroid, Moment of Inertia of plane area (Rectangle, circle, triangle using Integration Method; T section, I section, Angle section, Hollow section using standard formula) - Parallel axis theorem and perpendicular axis theorem- Polar moment of inertia -Mass moment of inertia of thin rectangular section -Relation between area moment of inertia and mass moment of inertia. [12] **Dynamics of Particles**

Displacement, Velocity, acceleration and their relationship–Relative motion -Projectile motion in horizontal plane– Newton's law–Work Energy Equation – Impulse and Momentum. [12]

Elements of Rigid Body Dynamics, friction and Beams

Translation and Rotation of Rigid Bodies: Velocity and acceleration–General Plane motion: Crank and Connecting rod mechanism.

Friction

Frictional force–Laws of Coloumb friction–Simple contact friction–Ladder friction-Rolling resistance–Ratio of tension in belt.

Transverse bending on beams

Types of beams: Supports and loads – Shear force and bending moment in beams – Cantilever, simply supported and overhanging beams. [12]

Total Hours: 45 + 15(Tutorial) = 60

Text Book(s):

1. Rajasekaran, S., Sankarasubramanian, G., Fundamentals of Engineering Mechanics, Vikas Publishing House Pvt. Ltd., 3rd Edition, 2017.
2. Beer, F.P and Johnson Jr. E.R, "Vector Mechanics for Engineers", Statics and Dynamics, McGraw-Hill International, 11th Edition, 2016.

Reference(s)

1. Jayakumar, V. and Kumar, M, "Engineering Mechanics", PHI Learning Private Ltd, New Delhi, 2012
2. Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd.,
3. Bansal R.K," Engineering Mechanics" Laxmi Publications (P) Ltd, 2011.
5. Irving H. Shames, Engineering Mechanics: Statics and Dynamics", Pearson Education Asia Pvt. Ltd, 4thEdition, 2003.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	3								2	2	1
2	3	2	2	3								2	2	1
3	3	2	2	3								2	2	1
4	3	2	2	3								2	2	1

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5	3	2	2	3								2	2	1

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50 CS 001 - Programming for Problem Solving								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	50	50	100

Objective(s)

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

Course Outcomes

At the end of the course, the student will be able to:

CO1: Infer the evolution, generation, representation of problem and recognize the concepts of data types and expressions

CO2: Annotate the concept of console Input and output features and examine the execution of branching, looping statements, arrays and strings

CO3: Recognize the concepts of functions, recursion, storage class specifies and pointers with its features

CO4: Comprehend basic concepts of structures ,unions ,user defined data types and preprocessor

CO5: Interpret the file concepts using proper standard library functions

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

Introduction to Computer and Programming

Introduction to Computers - Evolution of computers - Generations of computers and Programming Languages– Introduction to components of a computer system -Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart–Pseudocode with examples. From algorithms to programs– variables (with data types)– Type Qualifiers - Constants – Operators –expressions and precedence [9] **I/O ,Branching ,Loops and Arrays**

Console I/O– Unformatted and Formatted Console I/O – Conditional Branching and Loops -Writing and evaluation of conditionals and consequent branching -Iteration and loops - Arrays (1-D, 2-D), Character arrays and Strings [9]

Functions and Pointers

Functions: Scope of a Function – Library Functions and User defined functions - Function Prototypes – Function Categorization - Function Arguments - Arguments to main function - The return Statement - Recursion - Passing Arrays to Functions– Storage class Specifiers.Introduction to Pointer Variables - The Pointer Operators - Pointer Expressions - Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers– Dynamic memory allocation[9]

Structures, Unions, Enumerations, Typedef and Preprocessors

Structures - Arrays of Structures- Arrays and Structures within Structures - Passing Structures to Functions - Structure Pointers - Unions – BitFields - Enumerations - typedef – The preprocessor and comments. [9] **File**

File: Streams –Reading and Writing Characters - Reading and Writing Strings -,File System functions - Random Access Files [9]

Text book:

1	Herbert Schildt, “The Complete Reference C”, Fourth Edition, Tata McGraw Hill Edition, 2010.

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2	Byron Gottfried, “Programming with C”, Third Edition, McGraw Hill Education, 2014.
Reference(s):	
1	E.Balagurusamy, “Programming in ANSI C”, Seventh Edition, Tata McGraw Hill Edition, New Delhi, 2016.
2	Brian W. Kernighan and Dennis M. Ritchie, “C Programming Language”, Prentice-Hall.
3	Reema Thareja, “Computer Fundamentals and Programming in C”, Second Edition, Oxford Higher Education, 2016.
4	K N King, “C Programming: A Modern Approach”, Second Edition, W.W.Norton, New York, 2008.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	3		3				3	3	2	2	2	
2	3	2	3		3				3	3	2	2	3	
3	3	2	3		3				3	3	2	2	3	
4	3	2	3		3				3	3	2	2	3	
5	3	2	3		3				3	3	2	2	3	

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50 CH 0P1 - Chemistry Laboratory

Common to all Branches

Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	0	0	4	60	2	60	40	100

Objective(s)	• To test the knowledge of theoretical concepts. • To develop the experimental skills of the learners. • To facilitate data interpretation. • To enable the learners to get hands-on experience on the principles discussed in theory sessions. • To expose the learners to various industrial and environmental applications.
Course Outcomes	**At the end of the course the students will be able to** CO1: Calculate the amount of hardness, alkalinity, chloride ion and dissolved oxygen in water sample CO2: Estimate the amount of barium chloride and mixture of acids by conductometry CO3: Infer the amount of acid by pH metry and ferrous ion by potentiometry CO4: Estimate the amount of ferrous ion by spectrophotometry CO5: Determine the percentage of corrosion by weight loss method

LIST OF EXPERIMENTS

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1. Estimation of hardness of water by EDTA method.
2. Estimation of alkalinity of water sample.
3. Estimation of chloride content in water sample (Argentometric method).
4. Determination of dissolved oxygen in boiler feed water (Winkler's method).
5. Estimation of barium chloride by conductometric precipitation titration.
6. Estimation of mixture of acids by conductometric titration.
7. Estimation of ferrous ion by potentiometric titration.
8. Estimation of HCl, beverages and other biological samples by pH meter.
9. Estimation of iron content by spectrophotometry method.
10. Determination of corrosion rate and inhibitor efficiency by weight loss method.

Lab Manual

1	Dr. S.Vairam and Dr. Suba Ramesh, "Engineering Chemistry", Wiley India Private Limited , Delhi, 2nd edition, January 2013.
2	S.S. Dara, "A Text Book on Experiments and Calculations Engineering", S.Chand & Co., Ltd., 2nd edition, 2003

Reference(s)

1	Mendham. J, Denney. R.C, Barnes. J.D, and Thomas. N.J.K, "Vogel's Text Book of Quantitative Chemical Analysis", Pearson Education, 6th edition, 2009.
2	O P Vermani , and A K Narula, "Applied Chemistry : Theory And Practice, New Age International (P) Ltd., Publishers, 2nd edition, January 2020.
3	Gary D. Christian, "Analytical Chemistry", John Wiley & Sons, 6th edition, 2007.
4	Chatwal Anand, "Instrumental Methods of Chemical Analysis", Himalaya Publications, 5th Edition,2019.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3		1	2		3	1		2		
2	3	3	3	2					3	1				
3	3	3	3	2					3	1				
4	3	3	3	3			1		3	1				
5	2	2	2	2					3	1			1	1

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50 CS 0P1 - Programming for Problem Solving Laboratory

Common to all Branches

Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	0	0	4	60	2	60	40	100

Objective(s)	• To enable the students to apply the concepts of C to solve simple problems • To use selection and iterative statements in C programs • To apply the knowledge of library functions in C programming • To implement the concepts of arrays, functions, structures and pointers in C • To implement the file handling operations through C
Course Outcomes	**At the end of the course the students will be able to** CO1: Apply how to read, display basic information and use selection and iterative statements CO2: Demonstrate C program to manage collection of related data CO3: Design and Implement different ways of passing arguments to functions, Recursion and implement pointers concepts CO4: Develop a C program to manage collection of different data using structures, Union, user-defined datatypes and preprocessor directives CO5: Demonstrate C program to store and retrieve data using file concepts

LIST OF EXPERIMENTS

1 Implementation of Simple computational problems using various formulas.

2 Implementation of Problems involving Selection statements.

3 Implementation of Iterative problems e.g., sum of series.

4 Implementation of 1D Array manipulation. 5 Implementation of 2D Array manipulation.

6 Implementation of String operations.

7 Implementation of Simple functions and different ways of passing arguments to functions and Recursive Functions.

8 Implementation of Pointers

9 Implementation of structures and Union.

10 Implementation of Bit Fields, Typedef and Enumeration.

11 Implementation of Preprocessor directives.

12 Implementation of File operations.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	3		3				3	3	2	2	2	

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2	3	2	3		3				3	3	2	2	3	
3	3	2	3		3				3	3	2	2	3	
4	3	2	3		3				3	3	2	2	3	
5	3	2	3		3				3	3	2	2	3	

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50 EN 002 – Communication Skills II

Common to all Branches

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	1	1	0	30	2	50	50	100

Objective(s)

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

Course Outcomes

At the end of the course, the students will be able to

CO1: Identify speaker's purpose &tone, comprehend relationship between ideas and respond to the listening content

CO2:Use communicate strategies, vocabulary & appropriate grammatical structures for effective oral interactions

CO3: Make inferences & predictions develop reading speed, build academic vocabulary by utilizing digital literacy tools on textual comprehension

CO4: Use a variety of accurate sentence structures with functional vocabulary, apply the conventions of academic writing and use peer and teacher feedback for effective writing

CO5: Demonstrate proficiency in communication skills in academic and professional Contexts

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Advanced English Listening Module

Extended Listening to Podcasts – Listen and Watch Video Clips - answering Inferential Multiple Choice Questions and Vocabulary Check- Listening to Lengthy Discourses – Structured Listening – Listening to Songs and Cognizing the Lyrics- Listening to popular speeches, news briefs and stories **[10]**

Oral Communication

Debates – Group Discussion (Structured) and rotate roles – Elevator Speech – Prepared Talk – Extempore – Brief Technical presentations- Spin-a-Yarn – Short Film reviews – talk on silent videos – Dialogues and Role plays (Intermediate & Higher Level) – Interviews [**14]**

Critical Reading Process

Silent Reading – Scanning and Skimming - Reading comprehension with logical reasoning questions – Cognition of Theme and Inferential Meaning – advanced Academic and Functional Vocabulary List (1000 words) – word webs and semantic threads - Loud Reading – Modulation and Pronunciation Check – Mind maps – Note making – Deep Reading Skills **[11]**

Academic Writing Practices

Sentence Equivalence and Text completion tasks – Data Interpretation - Essay Writing – Letter Writing – Business Emails – Conversational Fill Ups-Rewordify (select a text and simplify/enhance the language)- Reports on events **[10]**

Total Hours: 15+15(Tutorial) = 30 Hours

Text Books:

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1.	M.Ashraf Rizvi, '*Effective Technical Communication',* 2nd Edition, McGraw Hill Education (India) Private Limited, Chennai, 2018
2.	Norman Lewis, *'Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book'*, Penguin Random House India, 2020
References:	
1.	Paul Emmerson and Nick Hamilton , *'Five Minute Activities for Business English',* Cambridge University Press, N.York, 2005
2.	Ruth Wainry b, *'Stories: Narrative Activities for The Language Classroom'*, Cambridge University Press, N.York, 2005
3.	Stuart Redman, *'English Vocabulary in Use: Upper Intermediate'*, Cambridge University Press, N.Y, 2006
4.	https://www.khanacademy.org/test-prep/sat/sat-reading-writing-practice

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					2			2	3	3	2	3	2	2
2								2	3	3	2	3	2	2
3					2			2	3	3	2	3	2	2
4					2			2	3	3	3	3	2	2
5					2			2	3	3	3	3	1	1

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50 MA 002 - Laplace Transform and Complex Variables

Common to All Branches

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	50	50	100

Objective(s)

- To provide exposure and ability in handling situations involving multiple integrals, Beta and Gamma functions.
- To familiarize the students with the basic concepts in Vector calculus.
- To get exposed to the fundamentals in analytic functions, conformal mappings and Bilinear transformation.
- To acquire skills to understand the concepts involved in Cauchy's integral formula, Cauchy's residue theorem and Contour integration.
- To understand the concepts in Laplace transform techniques and its properties.

Course Outcomes

At the end of the course, the students will be able to

CO1: Evaluate double and triple integrals and analyze Beta and Gamma functions.

CO2: Analyze the basic concepts of vector calculus to verify Green's, Stoke's and Gauss Divergence theorems.

CO3: Construct the analytic functions and Bilinear transformation.

CO4: Apply Cauchy's integral formula and Cauchy's residue theorem to evaluate the complex integrals.

CO5: Apply Laplace transform techniques for solving differential equations.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

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Multiple Integrals

Double integration – Cartesian and polar coordinates – Change of order of integration – Area between two curves – Area as double integral – Triple integration in Cartesian coordinates.

Beta and Gamma functions**:** Relationship between Beta and Gamma functions – Properties – Problems. [9]

Vector Calculus

Introduction - gradient of a scalar point function - directional derivative - angle of intersection of two surfaces – divergence and curl(excluding vector identities) - solenoidal and irrotational vectors - Green's theorem in the plane - Gauss divergence theorem -Stokes' theorem(without proof)- verification of the above theorems and evaluation of integrals using them. [9]

Analytic Functions

Analytic functions – Necessary conditions (Cauchy–Riemann equations)- Polar form of Cauchy–Riemann equations – Sufficient conditions (without proof) – Properties of analytic functions – Harmonic function –Harmonic conjugate – Construction of analytic functions– Conformal mapping: w = z + a, az, 1/z -Bilinear transformation. [9]

Complex Integration Cauchy's Integral theorem (without proof) – Cauchy's integral formula – Taylor's and Laurent's series (without proof) – Classification of singularities – Cauchy's residue theorem – Contour integration – Circular and semi-circular

contours (excluding poles on real axis). [8]

Laplace Transforms

Conditions for existence – Transform of elementary functions – Basic properties – Shifting theorems- Derivatives and integrals of transforms –– Transform of unit step function – Dirac's delta function- Initial and final value theorem– Transform of periodic functions. Inverse Laplace transform – Convolution theorem(excluding proof) – Solution of second order ordinary differential equation with constant co-efficients – simultaneous equations of first order with constant co-efficients. [10]

Total Hours: 45 + 15(Tutorial) = 60 hours

Text book:

1	B. S. Grewal, "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, Delhi, 2014. Website: https://pvpsitrealm.blogspot.com/2016/09/higher-engineering-mathematics-by-bs.html
2	Kreyszig Erwin, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Limited, New Delhi, 2016.

Reference(s):

1.	N. P. Bali and Dr.Manish Goyal, "A text book of Engineering Mathematics",8th Edition,Laxmi Publications (P) LTD,2011
2.	T. Veerarajan, "Engineering Mathematics", for Semesters I and II , Tata McGraw Hill Publishing Co., New Delhi., 2010.
3.	Dr.P. Kandasamy , Dr. K. Thilagavathy and Dr. K. Gunavathy , "Engineering Mathematics -II", S.Chand & Company Ltd, New Delhi.
4.	SWAYAM online video courses.(www.swayamprabha.go/v.in).

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	2	3							2	3	2
2	3	3	2	2	3							2	3	2
3	3	3	3	2	2							2	3	2
4	3	3	2	2	3							2	3	2
5	3	3	2	3	3							2	3	2

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50 PH 003 - Semiconductor Optoelectronics								
Common to CS,IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	50	50	100

Objective(s)	• To enhance students' knowledge of theoretical and modern technological aspects in semiconductor physics. • To enable the students to correlate the theoretical principles with application oriented studies in optoelectronic materials • To Explain the principles of laser, types of laser and demonstrate the applications of laser • To state the principle of optical fiber and to understand the design and applications of optical fibers. • To introduce advanced materials and nano technology for various engineering applications
Course Outcomes	**At the end of the course, students will be able to** CO1: Analyze the basic ideas of semiconductors and devices CO2: Apply the principles of LCD, photodetectors and optoelectronic devices CO3: Outline the basic ideas about classification of laser and various applications of laser. CO4: Elaborate the propagation of light in fiber optic cables, communication link and applications CO5: Gain broad view on advanced materials, nano technology and their engineering applications

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

Semiconductor Physics

Introduction-Elemental and compound semiconductors-Intrinsic and extrinsic semiconductors-Properties-carrier concentration in intrinsic and extrinsic semiconductors (qualitative)-p-n junction diode: characteristics-p-n junction transistors: characteristics (CB and CE)-Bipolar characteristics (Biased and unbiased)-FET: characteristics and applications. [10]

Optoelectronic Materials and Devices

Photoconductive materials – Light Dependent Resistor – Working of LDR – Applications of LDR – Photovoltaic materials – Solar cell – Construction and working of a solar cell – Applications of solar cells – Liquid crystals – Liquid crystal Display (LCD) – Construction and advantages of LCD – Electro optic materials – Optoelectric effect-Electro-Optic Modulation.

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Laser Technology Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion- different types of lasers: gas lasers (CO_2), solid-state lasers (Nd: YAG), dye lasers, Semiconductor laser (Homojunction and Hetero junction)-Properties of laser beams-applications of lasers in science and engineering.[8]

Fiber Optics and Sensors

Principles – cone of acceptance, numerical aperture (derivation)- Modes of propagation –Fabrication of optical fibre: Crucible-crucible technique - Classification: based on materials, modes and refractive index profile– Splicing : types of splicing- Losses in optical fiber – Detectors – Fiber optical communication links (Block diagram) – Advantage of fiber optical cable over copper cables- Fiber optic sensors: liquid level sensors, Temperature and Displacement sensors. [9]

Advanced Materials and Nanotechnology

New Engineering Materials: Metallic glasses – preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications – advantages and disadvantages of SMA **Nano Materials:** Nanomaterials: Properties- Top-down process: Ball Milling method – Bottom-up process: Vapour Phase Deposition method- Carbon Nano Tube (CNT): Properties, preparation by electric arc method, Applications. [9]

Total Hours: 45

Text book:

1	Rajendran V, "Engineering Physics", Tata McGraw Hill, New Delhi, 2011
2	Arumugam M, "Engineering Physics-II", 6th Anuradha Publications, Kumbakonam, 2010.

Reference(s):

1	Malvino, "Electronic principle", 6th edition, Tata McGraw Hill, New Delhi, 1999.
2.	P.K.Palanisamy "Physics of Materials", Scitech Publications,Chennai-2012.
3.	Mehtha V.K. , principles of electronics s.chand & co. Ltd New Delhi **edition :**IV**year :**1993
4.	Raghavan V, "Materials and Engineering", Prentice-Hall of India, New Delhi, 2007.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	3		3			2		3	2	2
2	3	3	2	3	3		3			2		3		2
3	3	3	3	3	2	2	3			2		3		2
4	3	3	3	2	3	2	2			2		3		2
5	3	3	3	2	3	2	2			2		3		2

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50 EE 001- Basic Electrical Engineering

Common to all Branches

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	50	50	100

Course Objectives

- To familiarize the basic DC and AC networks used in electrical circuits
- To explain the concepts of electrical machines and their characteristics
- To explore the sources of electric power generation and various types of power plant
- To identify the various components of low voltage electrical installation
- To describe various energy conservation methods useful in industry and commercial purpose

Course Outcomes

At the end of the course, the students will be able to

CO1: Apply the basic laws of electric circuits to calculate the unknown quantities.
CO2: Acquire knowledge about the constructional details and principle of operation of DC machines and AC machines
CO3: Impart the knowledge of generation of electricity based on conventional and non-conventional energy sources
CO4: Recognize the significance of various components of low voltage electrical installations.
CO5: Create awareness of energy conservation and electrical safety

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

DC and AC Circuits

Electrical circuit elements (R, L and C), Voltage and current sources - Kirchhoff's current and voltage laws - Serial and parallel circuits - Analysis of simple circuits with DC excitation. Representation of sinusoidal waveforms, Peak and RMS values, Phasor representation, Real power, Reactive power, Apparent power, Power factor. Analysis of single- phase AC circuits consisting of R, L, C, RL, RC, RLC combinations. [12]

DC Machines

Construction, Types and Operation, Simple Problems – Applications. [6]

AC Machines

Faraday's laws of electromagnetic induction – Transformers: Construction, Working principle, Types, Losses in transformers, Regulation, Efficiency and applications.

Generation of rotating magnetic fields - Three-phase induction motor: Construction, working principle, Characteristics, Starting-Single-phase induction motor: Construction, working principle and applications - Synchronous generators: Construction, Working principle and applications. [8]

Electrical Power Generation Systems

Sources of electrical energy: Renewable and nonrenewable - Principles and schematic diagram of Hydroelectric power plant, Thermal power plant, Nuclear power plant, Solar PV system and Wind energy conversion systems. [5]

Electrical Installations and House Wiring

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB - Types of Batteries, Important Characteristics for Batteries – UPS.

Single phase and three phase systems: Three phase balanced circuits, Phase sequence, voltage and current relations in star and delta connections- Basic house wiring tools and components – Domestic wiring: Service mains, meter board, distribution board, energy meter. Different types of wiring: staircase, fluorescent lamp and ceiling fan. [8]

Electrical Energy Conservation &Safety

Elementary calculations for energy consumption –BEE Standards –Electrical energy conservation – Methods. Electric shock, Precautions against shock, Objectives of earthing, Types of earthing - Basic electrical safety measures at home and industry. [6]

Total Hours: 45

Text book(s):

1	D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2017.
2	D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2017.

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Reference(s):	
1	L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
2	E. Hughes, “Electrical and Electronics Technology”, Pearson, 2016.
3	V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 2015.
4	Vincent Del Toro, Electrical Engineering Fundamentals Prentice Hall, 2006.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3			2					2	3		3	2
2	3	3	1	1			2		2		2	1	3	2
3	3	3	2	2			2	2	1			1	3	3
4	3	3		2		2					2	2	3	2
5	3	3	2	1	2	2			2		2	2	3	2

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50 ME 002– Engineering Graphics

Common to EEE, ECE, E&I, CSE, IT, Bio-Tech, NST and FT branches

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	2	0	4	90	4	50	50	100

Objective(s)

- To learn Computer Aided Drawing skills to enable graphical communication.
- To learn drawing formats and conversion of pictorial views into orthographic views.
- To emphasize skills to project simple solids and sectional views.
- To impart the knowledge on use of drafting software to draw the isometric projection.
- To acquire graphical skills to illustrate design project.

Course Outcomes

At the end of the course, the student will be able to:

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

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction to Computer Aided Drafting (CAD) Software

Theory of CAD software – Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension) – Drawing Area (Background, Crosshairs, Coordinate System) – Dialog boxes and windows – Shortcut menus (Button Bars) – The Command Line and Status Bar – Different methods of zoom as used in CAD – Select and erase objects. [5+12]

Orthographic Projection

Theory of projection – Terminology and Methods of projection – first angle and third angle projection – Conversion of pictorial views into orthographic views. [6+12]

Projection of Solids and Sections of Solids

Projections of simple solids: prism, pyramid, cylinder and cone (Axis parallel to one plane and perpendicular to other, axis inclined to one plane and parallel to other).

Sections of simple solids: prism, pyramid, cylinder and cone in simple positions (cutting plane is inclined to one of the principal planes and perpendicular to the other) – True shape of sections. [6+12] **Isometric Projection**

Principles of Isometric projection – Isometric scale, Isometric views, Conventions – Isometric views of lines, Planes, Simple and compound Solids – Conversion of Orthographic views in to Isometric view. [6+12]

Application of Engineering Graphics

Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids – Geometric dimensioning and Tolerancing– Use of solid modeling software for creating associative models – Floor plans: windows, doors, and fixtures such as water closet (WC), bath sink, shower, etc. – Applying colour coding according to building drawing practice – Drawing sectional elevation showing foundation to ceiling – Introduction to Building Information Modelling (BIM). [7+12]

Total Hours: 90

Text Book(s):

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

Reference(s)

1. Shah M.B., Rana B.C., and V.K.Jadon., “Engineering Drawing”, Pearson Education, 2011.
2. Natarajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2014.

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

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	3	3	3	1	1	1		3	2	2	1	3
2	3	3	3	3	3	1		1		3	1	1	1	3
3	3	3	3	3	3	1		1		3	1	1	1	3
4	3	3	3	3	3	1		1		3	1	1	1	3
5	3	2	3	3	3	1	1	1		3	2	2	1	3

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50 MY 006 – Essence of Indian Traditional Knowledge

Common to all Branches

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

Objective(s)

- To imparting basic principles of thought process, reasoning and inferencing.
- To gain knowledge on sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature.
- To inculcate holistic life style of yogic science and wisdom capsulesin
- To know sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.
- To gain the knowledge on Indian artistic and its tradition

Course Outcomes

At the end of the course, the student will be able to

CO1: Know many festivals have religious origins and entwine cultural and religious significance in traditional activities

CO2: Know harvest festivals, celebrate seasonal change CO3:
Ability to do case studies on philosophical tradition

CO4: Perform Indian artitstic works

CO5: Ability to conduct exhibition and advertisement about artistic

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

Basic structure of Indian Knowledge System	[6]
Modern Science and Indian Knowledge System	[6]
Yoga and Holistic Healthcare	[6]
Case studies, Philosophical Tradition	[6]
Indian Linguistic Tradition (Phonology, morphology, syntax and semantics), Indian Artistic Tradition	[6]
Total Hours	**30**

Text book(s):

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1.	V.Sivaramakrishnan(Ed.),"Cultural Heritage of India Course material", Bharatiya Vidya Bhavan, Mumbai, 5th Edition,2014.
2.	G N Jha (Eng. Trans.), Ed. RN Jha, "Yoga-darshanamwithVyasa Bhashya", dyanidhi Prakashan, Delhi, 2016.
Reference(s):	
1.	RN Jha, "Science of Consciousness Psychotherapy and Yoga Practices", Vidyanidhi Prakashan, Delhi, 2016
2.	Sengupta, Nirmal, "Traditional Knowledge in Modern India Preservation, Promotion, Ethical Access and Benefit Sharing Mechanisms", Springer, 2014.
3.	Kapil Kapoor, Textbook of "Knowledge Traditions and Practices of India", Ancient Scientific Publishing, 2015
4.	Kapoor Kapil, "Indian Knowledge Systems: Vol. 2", Ancient Scientific Publishing, 2017

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1						3						3		
2						3						3		
3					3							3		
4								3				3		
5									2			3		

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50 PH 0P2- Applied physics Laboratory								
Common to – ECE, EEE, EI, CSE, IT								
Semester	**Hours/week**			**Total hrs**	**Credit**	**Maximum marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
II	0	0	4	60	2	60	40	100

Objectives	• To gain practical knowledge by applying the experimental methods to correlate with the Physics theory. • To demonstrate an ability to make physical measurements and understand the limits of precision in measurements • To introduce different experiments to test basic understanding of physics concepts applied in optics and electronics. • To enable the students to correlate the theoretical principles with application oriented studies. • To analyze the behavior and characteristics of various materials for its optimum utilization
Outcomes	**At the end of the course, the students will be able to** CO1:Find the wavelength of laser and the particle size.(1) CO2:Gain the knowledge of interference to produce Newton rings and air wedge.(2-3) CO3:Apply the knowledge of diffraction property of light through grating and fiber optic cable (4,6) CO4:Obtain the concept of refractive index and dispersion of light by a prism(5) CO5:Realize the knowledge of semiconductor band gap and Hall coefficient, photovoltaic solar cells, Zener diode (7-10)

LIST OF EXPERIMENTS

1. Determination of wavelength of laser and particle size – diffraction.
2. Determination of radius of a plano convex lens – Newton's ring.
3. Determination of a thickness of thin wire – Air wedge method.
4. Determination of wavelength of mercury spectral lines – spectrometer grating.
5. Determination of dispersive power of a prism.
6. Determination of NA, acceptance angle of an optical fiber.
7. Determination of band gap of a semiconductor PN junction diode.
8. V-I characteristics of solar cell.
9. Characteristics of Zener diode.
10. Determination of Hall coefficient of a given semiconductor and its charge carrier density.

Lab Manual:

"Physics Lab Manual", Department of Physics , KSRCT

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2					3	3		2		2
2	3	2	2	2					3	3				2
3	3	3	2	2					3	3		2		2

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4	3	2	2	2					3	3				2
5	3	3	3	3					3	3				2

Passed in BoS Meeting held on 22/12/2022
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50 ME 0P1 – Engineering Practices Laboratory

Common to all branches

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	0	0	4	60	2	60	40	100

Objective(s)

- To acquire skills in basic engineering practices.
- To identify the hand tools and instruments.
- To provide hands on experience in Fitting, Carpentry, Sheet metal, Welding and lathe shop.
- To provide practical training on house hold wiring and electronic circuits.
- To offer real time activity on plumbing connections in domestic applications.

Course Outcomes

At the end of the course, the student will be able to:

CO1: Perform facing, plain turning, drilling.
CO2: Make a model of fitting and carpentry: Square, Dovetail and Cross lap joints.
CO3: Fabricate the models of sheet metal and welding joints.
CO4: Construct and demonstrate electrical and electronic wiring circuit.
CO5: Construct the water pipe line in plumbing shop.

Machine Shop

Safety aspects in machine shop, Study of Lathe and Radial drilling machine, Turning, Facing and Drilling.

Fitting and Carpentry

Safety aspects in Fitting and Carpentry, Study of tools and equipments, Preparation of models- Square, Dove tail joint, Cross Lap.

Sheet Metal and Welding

Safety aspects in Sheet metal and Welding, Study of tools and equipments, Sheet metal models - Scoope, Cone, Tray, Preparation weld joints -Lap, butt, T-joints. Study of Gas Welding and Equipments.

Electrical Wiring & Electronics

Safety aspects of Electrical wiring, Study of Electrical Materials and wiring components, Wiring circuit for a lamp using single and stair case switches. Wiring circuit for fluorescent lamps, Basic electronic circuit.

Plumbing

Study of plumbing tools, assembly of G.I. pipes/ PVC and pipe fittings, Cutting of threads in G.I.Pipes/PVC by thread cutting dies.

Smithy, Plastic Moulding and Glass Cutting

Safety aspects in smithy, plastic moulding and glass cutting, Study of tools and equipments.

Lab Manual :

1. “Engineering Practices Lab Manual”, Department of Mechanical Engineering, KSRCT.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	1	3	2	2	3	1	2	2	1	3	1
2	3	2	2	1	3	2	2	3	1	2	2	1	3	1
3	3	2	2	1	3	2	2	3	1	2	2	1	3	1
4	3	2	2	1	3	2	2	3	1	2	2	1	3	1
5	3	2	2	1	3	2	2	3	1	2	2	1	3	1

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50 MA 005 - Probability and Statistics

Common to CS, IT

Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	50	50	100

Objective(s)	• To acquire skills in the concepts of the probability • To provide exposure and ability in handling situations involving distributions. • To learn basic concepts in descriptive statistics and quantitative variables. • To develop the knowledge with various methods in hypothesis testing. • To get exposed to various statistical methods designed to make scientific judgments
Course Outcomes	**At the end of the course the student will be able to** CO1: Apply the concepts of one-dimensional random variables to calculate the probability. CO2: Apply discrete and continuous distributions concepts to calculate the probability. CO3: Compute measures of central tendency, measures of dispersion and calculate correlation and regression. CO4: Analyze the concepts in curve fitting methods and test the statistical hypothesis using Student's t test, F test and Chi-square test. CO5: Analyze the design of experiments using CRD, RBD and Latin square.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Probability and Random Variables

Axioms of probability – Conditional probability –Baye's theorem–Random variable – Expectation –Probability mass function – Probability density function – Properties – Moments – Moments generating function and their properties. [9]

Standard Distributions

Discrete Distributions: Binomial, Poisson and Geometric distributions – Continuous Distributions: Uniform, Exponential, Gamma and Normal distributions – Properties – Problems. [9]

Statistics

Measures of Central tendency – Mean, Median and Mode – Moments, Measure of dispersion – Skewness and Kurtosis – Range - Quartile deviation – Karl Pearson's Coefficient of skewness – Bowley's Coefficient of skewness – Correlation and Regression – Rank correlation. [9]

Sampling and Testing

Curve fitting by the method of least squares – Fitting of straight lines: $y = ax + b$, $y = ab^x$ – Second degree Parabola – Test of significance: small samples –Student's t-test, F-test, Chi-square test for goodness of fit and independence of attributes [9]

Design of Analysis

ANOVA – Completely Randomized Designs – One way classification – Randomized Block Design – Two way classification –Latin square design [9]

Total Hours: 45 + 15(Tutorial) = 60 hours

Text book (s) :

1	S.P. Gupta, "Statistical Methods", Sultan Chand & sons Ed 45th , New Delhi, 2017.
2	T. Veerarajan , "Probability, Statistics and Random Processes", Tata McGraw-Hill Ed Third, New Delhi, 2008.

Reference(s):

1	S. Ross , "A first Course in Probability", Pearson Education Ed Fifth, New Delhi, 2002.

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2	R. A. Johnson , “Miller & Freund’s Probability and Statistics for Engineers”, Pearson Education Ed Sixth, New Delhi, 2000.
3	P. N. Arora and S Arora , “Statistics for Management”, S.Chand & Company Ltd., New Delhi, 2003.
4	V. K. Kapoor and S C Gupta , “Fundamentals of Mathematical Statistics “,Sultan Chand & sons Ed Twelth, New Delhi, 2020

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	3	2	2							3	2	3
2	3	3	3	2	2							3	2	3
3	3	2	3	2	3	3					3	3	3	3
4	3	3	3	3	3	3					3	2	3	3
5	3	3	3	3	3	3					3	2	3	3

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50 CS 002 –Data Structures

Common to CS,IT,EE,EC

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	50	50	100

Objective(s)

- To choose the appropriate data structure for a specified application
- To design and implement abstract data types such as linked list, stack, queue and trees
- To demonstrate various sorting, searching and graph algorithms
- To Learn and implement the hashing techniques
- To design a Priority Queue ADT and its applications

Course Outcomes

At the end of the course, the students will be able to

CO1: Express the concept of Linear data structures, applications and its implementations
CO2: Appraise the knowledge of Tress with its operations
CO3: Recognize the concept of Sorting ,Searching and its types
CO4: Review various implementations and operations of Priority Queue and Hashing Techniques
CO5: Apply Shortest Path and Minimum Spanning Tree algorithms and Biconnectivity

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Lists, Stacks And Queues

Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT [12]

Trees

Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – B – Trees –B+Trees. [9]

Sorting and Searching

Preliminaries – Insertion Sort – Shellsort – Heapsort – Mergesort – Quicksort – External Sorting –Searching: Sequential search- Binary Search –Hashed list searches [7]

Hashing and Priority Queues (Heaps)

Hashing – Hash Function – Separate chaining – Open addressing – Rehashing – Extendible hashing – Priority Queues (Heaps) – Model – Simple Implementations – Binary Heap – Applications of Priority Queues – d –Heaps. [7]

Graphs

Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm, Kruskal's Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity. [10]

Total Hours: 45 hours

Text book:

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd edition, Pearson Education Asia.2008
2. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education Asia, 2009

Reference(s) :

1. Rajesh K.Sukla," Data structure using C & C++", Wiley India,2012
2. A. Tannenbaum, "Data Structure Using C", Pearson Education, 2003.
3. Goodrich & Tamassia, "Data Structures and Algorithms in C++", 2nd Edition, John Wiley & Sons, 2011
4. Reema Thareja, "Data Structures Using C", Second Edition, Oxford Higher Education, 2014.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

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1	3	3	2	2				1	2			2	3	3
2	3	3	2	3				1	3			2	3	3
3	3	3	2	2	2	2		1	3	2		2	3	3
4	3	3	2	3	2			3	2	2		2	3	3
5	3	3	2	3	2	2	2	3	3	2		2	3	3

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50 CS 003 –Object Oriented Programming

Common to CS,IT, EE, NST

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III / IV	3	0	0	45	3	50	50	100

Objective(s)

- To enable the students to learn how C++ supports object Oriented properties
- To create and use classes, objects, constructors and destructors for specific applications
- To learn how inheritance and virtual functions implement dynamic binding with polymorphism.
- To learn how to design and implement generic classes with C++ templates.
- To learn how to use exception handling in C++ programs.

Course Outcomes

At the end of the course, the students will be able to

CO1: Recognize the principles of object-oriented problem solving and programming
CO2: Implement the concept of classes and objects
CO3: Analyze the concept of reusability and compile time polymorphism
CO4: Recognize the concept of dynamic memory allocation and runtime polymorphism
CO5: Identify the uses of generic programming and exception handling

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction to C++ and Functions:

Evolution of C++ - Concepts of OOP – Advantages of OOP, Basics of C++: Structure of a C**++** Program**–** Streams in C++ and Stream Classes – Unformatted Console I/O Operations, C++ Declarations, Functions: Return by Reference –Default Arguments – Const arguments – Inline Functions – Function Overloading. [9] **Classes and Objects, Constructors and Destructors:**

Classes in C++ - Declaring Objects- Access Specifiers and their Scope – Defining Member Functions – Static Members – Array of Objects – Object as Function Arguments – Friend Function and Friend Classes, Constructors and Destructors: Characteristics – Parameterized Constructor – Overloading Constructor – Copy Constructor – Dynamic Initialization Constructor – Destructors. [9]

Inheritance, Compile Time Polymorphism and Type Conversion:

Inheritance: Reusability – Types of Inheritance – Abstract Classes – Object as Class Member, Operator Overloading: Rules for Operator Overloading – The Keyword Operator –Unary and Binary Operators Overloading-Overloading using Friend Function – Type Conversion. [10]

Pointers, Memory Models, Binding and Polymorphism:

Pointers: Pointer to Class – Pointer to Object – void, wild and this Pointers – Pointer to Constant and Constant Pointers, Memory Models: Dynamic Memory Allocation – Heap Consumption – Dynamic Objects, Polymorphism: Binding in C++ - Pointer to Base and Derived class objects – Working with Virtual Functions – Pure Virtual Functions – Object Slicing – Virtual Destructor. [9]

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Generic Programming with Templates, Exception Handling: Class Templates – Function Templates – Exception Handling: Principles of Exception Handling – try, throw and catch keywords – Re-throwing Exception – Specifying Exception. [8]	
Total Hours: 45 hours	
Text book(s):	
1.	Ashok N. Kamthane, “Programming in C++”, Pearson, Second Edition, 2016.
2.	Herbert Schildt, “ The Complete Reference C++”, Fourth Edition, McGraw-Hill Education, 2013.
Reference(s) :	
1.	Bjarne Stroustrup, “The C++ programming language”, Addison Wesley, 2013.
2.	Venugopal K.R., Rajkumar Buyya, ”Mastering C++”, Second Edition,McGraw-Hill Education, 2013.
3.	Rajesh K. Shukla, ”Object-Oriented Programming in C++”, Wiley-India Edition, 2008
4.	E Balagurusamy, ”Object Oriented Programming with C++”, Sixth Edition, McGraw-Hill Education, 2013.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	3		3				3	3	2	2	2	
2	3	2	3		3				3	3	2	2	3	
3	3	2	3		3				3	3	2	2	3	
4	3	2	3		3				3	3	2	2	3	
5	3	2	3		3				3	3	2	2	3	

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50 EC 002 - Digital Logic Circuits

B.E. Common to CS, IT

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	1	2	60	5	50	50	100

Objective(s)	• To introduce number systems and codes, basic postulates of Boolean algebra and show the correlation between Boolean expressions. • To design and analyse combinational circuits • To study the concept of sequential circuits. • To analyse the concept of asynchronous sequential circuits. • To introduce the concept of memories and programmable logic devices.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Explain the fundamentals of numbering system and apply Boolean algebra to design digital systems CO2: Analyze digital logic family and design combinational circuits CO3: Design and analyze synchronous sequential logic circuits CO4: Analyze the asynchronous sequential circuits. CO5: Explain the various semiconductor memories and implement combinational logic using PLDs

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Digital Fundamentals

Review of Number Systems –Conversion methods – complements –Binary codes: Weighted and non Weighted codes - Boolean postulates and laws – De-Morgan's Theorem - Boolean function - Logic Gates- Implementations of Logic Functions using logic gates, Minimization of Boolean expressions – Sum of Products (SOP) – Product of Sums (POS)- Canonical forms – – Karnaugh map Minimization – Don't care conditions. [9]

Logic Family And Combinational Circuits

TTL and CMOS Logic families and their characteristics.

COMBINATIONAL CIRCUITS: Design procedure – Adders - Subtractors – Serial,Parallel adder- BCD adder - Magnitude Comparator – Multiplexer / Demultiplexer - encoder / decoder – code converters: binary to gray, gray to binary, BCD to excess 3 code [9]

Sequential Circuits

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation – Application table – Edge triggering – Level Triggering –Ripple counters – Synchronous counters –Modulo – n counter–Design of Synchronous FSM– Analysis of clocked sequential circuits: state equation - State table – State diagram – State reduction & assignment - Register : shift registers - Universal shift register– Shift counters [9]

Asynchronous Sequential Circuits

Analysis procedure – Transition table - Flow table – Race conditions -Design of fundamental mode circuits – Primitive flow table – Reduction of state and flow table – Race free state assignment - Hazards: Static – Dynamic – Essential – Hazards elimination. [9]

Memory Devices

Classification of memories: ROM - PROM – EPROM – EEPROM – EAPROM, RAM. Static RAM Cell- Dynamic RAM cell Bipolar RAM cell – MOSFET RAM cell —Programmable Logic Devices: Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, and PAL. [9]

Total Hours: 45+15 = 60 hours

Practice:

1. Design and implement combinational circuits using logic gates
2. Design and implement synchronous sequential circuits
3. Construct and simulate combinational circuit using multisim
4. Construct and simulate synchronous & asynchronous sequential circuit using multisim **Tutorials:**

1. Number system, logic gates, K-map reduction
2. Design of combinational circuits
3. Design of sequential and asynchronous sequential circuits

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4. Hazards, PLDs Implementation of combinational logic circuit using ROM, PLA, PAL

Text book(s):	
1	M. Morris Mano, Michael D. Ciletti, 'Digital Design', 5th Edition, Pearson Education, New Delhi, 2016.
2	Anand Kumar, 'Fundamentals of Digital Circuits', 3rd Edition, Prentice Hall, 2016.
Reference(s) :	
1	Donald P.Leach and Albert Paul Malvino, GoutamSaha, 'Digital Principles and Applications', 7th Edition, Tata McGraw-Hill, New Delhi, 2016.
2	S. Salivahanan and S. Arivazhagan, 'Digital Circuits and Design'3rd Edition, Vikas Publishing House Pvt. Ltd, New Delhi, 16
3	John F.Wakerly, 'Digital Design: principles and practices', 4th Edition, Pearson Education, 2016.
4	Charles H.Roth, 'Fundamentals of Logic Design', 5th Edition, Brooks/cole, 2016.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	2	2									
2	3	3	3	2	3									
3	3	3	3	3	3									

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4	3	3	3	3	3									
5	2	2	3	2	3									

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50 CS 301 – Software Engineering								
Semester	Hours / Week			Total Hrs	Credit	Maximum Marks		
	L	T	P	45	C	CA	ES	Total
III	3	0	0		3	50	50	100

Objective(s)	• To understand the phases in a software project • To understand fundamental concepts of requirements engineering and Analysis Modeling. • To understand the various software design methodologies • To learn various testing and maintenance measures • To learn various project cost models and risk management
Course Outcomes	**At the end of the course, the students will be able to** CO1: Identify the key activities in managing a software project, Compare different process models. CO2: Concepts of requirements engineering and Analysis Modeling. CO3: Apply systematic procedure for software design and deployment. CO4: Compare and contrast the various testing and maintenance. CO5: Manage project schedule, estimate project cost and effort required.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Software Process and Agile Development

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models– Introduction to Agility-Agile process-Extreme programming-XP Process. [8]

Requirements Analysis and Specification

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document –Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets-Data Dictionary. [10]

Software Design

Design process–Design Concepts-Design Model–Design Heuristic–Architectural Design-Architectural styles, Architectural Design, Architectural Mapping using Data Flow-User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components. [8] **Testing and Maintenance**

Software testing fundamentals-Internal and external views of Testing-white box testing-basis path testing- control structure testing-black box testing-Regression Testing–Unit Testing –Integration Testing–Validation Testing–System Testing And Debugging–Software Implementation Techniques: Coding practices- Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering. [10]

Project Management

Software Project Management: Estimation–LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model–Project Scheduling–Scheduling, Earned Value Analysis Planning–Project Plan, Planning Process, RFP Risk Management–Identification, Projection-Risk Management-Risk Identification -RMMM Plan-CASE Tools. [9]

Total Hours: 45 hours

Text book(s):

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

Reference(s) :

1.	Pankaj Jalote, Software Engineering, A Precise Approach, Wiley India, 2010.
2.	Rajib Mall, Fundamentals of Software Engineering, Third Edition, PHI Learning Private Limited, 2009.

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3.	Kelkar S.A., Software Engineering, Prentice Hall of India Pvt Ltd, 2007.
4.	StephenR.Schach, Software Engineering, Tata McGraw-Hill Publishing Company Limited, 2007.
5.	http://nptel.ac.in/.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2									2	3	
2	3	3	3		3			2	2	2	2	2	3	2
3	3	3	3		3			2			3	2	3	
4	3	3	3	2	3		2	2		2	3	2	3	
5	3	3	3	3	3		2	2		2	3	2	3	2

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50 MY 002 - Environmental Science

Common to all Branches

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

Course Objectives

- To help the learners to analyze the importance of environment, ecosystem and biodiversity.
- To familiarize the learners with the impacts of pollution and control.
- To enlighten the learners about waste and disaster management.
- To endow with an overview of food resources and human health.
- To enlighten awareness and recognize the social responsibility in environmental issues.

Course Outcomes

At the end of the course, the students will be able to

CO1: Recognize the concepts and importance of environment, ecosystem and biodiversity.
CO2: Analyze the source, effects, and control measures of pollution.
CO3: Enlighten of solid waste and disaster management.
CO4: Alertness about food resources, population and health issues.
CO5: Analyze the social issues and civic responsibilities.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Environment, Ecosystem and Biodiversity

Environmental studies - Scope and multidisciplinary nature - Need for public awareness - Ecosystem - Food chain - Food web- Structure and function. Biodiversity - Values of biodiversity - Endangered and endemic species - Hot spots - India a mega biodiversity nation - Threats - Conservation - In-situ and ex-situ - Case studies. [6]

Environmental Pollution

Pollution - Air, water, soil, noise and nuclear - sources, effects and control measures - Impacts of mining. - Environment protection act- bio accumulation and bio magnification - Case studies. [6]

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Waste and Disaster Management

Waste – wealth from waste - carbon foot print - Solid waste - e-waste - sources, effects and control measures. Disaster management - Earth quakes - Landslides - Floods - Cyclones - Tsunami - Disaster preparedness - Case studies. [5]

Food Resources, Human Population and Health

World food problems - over grazing and desertification - effects of modern agriculture. Population - Population explosion and its impacts - HIV/AIDS - Cancer- Role of IT in environment and human health - Case studies. [6]

Social Issues and the Environment

Unsustainable to sustainable development - Use of alternate energy sources - Wind - Geothermal - Solar - Tidal - energy calculation and energy audit - Rain water harvesting - Water shed management - Deforestation - Green house effect - Global warming - Climate change - Acid rain - Ozone layer depletion - Waste land reclamation. Consumerism and waste products - Role of an individual in conservation of natural resources - Case studies. [7]

Total Hours : 30 hours

Text Book(s):

1. Anubha Kaushik and C P Kaushik, “Perspectives in Environmental Studies ”, New Age International Publishers, New Delhi, 6th edition , January 2018.
2. Tyler Miller. G, “Environmental Science”, Cengage Publications, Delhi, 16th edition, 2018.

Reference(s):

1. Gilbert M.Masters and Wendell P. Ela, ”Environmental Engineering And Science”, PHI Learning Private Limited, New Delhi, 3rd Edition, 2013.
2. Rajagopalan. R, “Environmental Studies” Oxford University Press, New Delhi, 2nd edition, 2012.
3. Deeksha Dave and Katewa. S.S, “Environmental Studies”, Cengage Publications, Delhi, , 2nd edition , 2013.
4. Cunningham, W.P. and Saigo, B.W. Environment Science, Mcgraw-Hill, USA. 9th edition, 2007.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1	2	1	1	2	3	3	3	3		2	1	
2	3	3	3	3	2	3	3	3	3	3	2	2	2	
3	3	3	3	3	2	3	3	3	3	3	2	2	2	
4	2	2	2	3	3	3	3	3	2	2	3	2	2	
5	3	3	3	3	3	3	3	3	3	3	3	2	2	

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50 CS 0P2 - Data Structures Laboratory

Common to CS,IT,EE,EC

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	60	C	CA	ES	Total
III	0	0	4		2	60	40	100

Objective(s)

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

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Course Outcomes	**At the end of the course, the students will be able to** CO1: Demonstrate the implementation of Linear Data structures and its applications CO2: Investigate Balanced Parenthesis and Postfix expressions with the help of Stack ADT CO3: Implement Non-Linear Data Structure CO4: Implement sorting and searching techniques CO5: Implement Shortest Path and Minimum Spanning Tree algorithm

1. Implementation of List Abstract Data Type (ADT)
2. Implementation of Stack ADT
3. Implementation of Queue ADT 4. Implementation of stack applications:
   (a) Program for 'Balanced Parenthesis'
   (b) Program for 'Evaluating Postfix Expressions'
5. Search Tree ADT
6. Implementation of Internal Sorting
7. Develop a program for external sorting
8. Develop a program for various Searching Techniques.
9. Implementation of Shortest Path algorithm
10. Implementation of Minimum Spanning tree algorithm.

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CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2						2			2	3	3
2	3	3	2	3					3			2	3	3
3	3	3	2	2	2	2			3	2		2	3	3
4	3	3	2	3	2			3	2	2		2	3	3
5	3	3	2		2	2	2	3	3	2		2	3	3

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50 CS 0P3 - Object Oriented Programming Laboratory

Common to CS,IT, NST

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	60	C	CA	ES	Total
III	0	0	4		2	60	40	100

Objective(s)	• To design various UML diagrams and develop object oriented programs using C++ with associated libraries. • To learn how to implement class, objects, constructors and destructors in C++. • To learn how to overload functions and operators in C++. • To learn how inheritance promote code reuse in C++. • To apply exception handling and use built in classes from STL.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Demonstrate the input/output operations and user defined functions CO2: Implement the concept of class and objects CO3: Demonstrate the concept of reusability and compile time polymorphism CO4: Implement the concept of dynamic objects and runtime polymorphism

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	CO5: Demonstrate the concept of templates and exception handling

The laboratory should be preceded by a tutorial to design UML diagrams.

1. Construct a C++ program to manage the input and output operations using stream classes
2. Construct a C++ program to manage large amount of statements using functions
3. Design a C++ program to implement the concept of class and objects
4. Develop a C++ program to initialize the class members using constructors and destroy the objects by using destructor
5. Design a C++ program for reusability using inheritance
6. Write a C++ program to perform compile time polymorphism
7. Develop a C++ program to implement the concept of dynamic objects
8. Develop a C++ program to implement runtime polymorphism
9. Develop a C++ program to allow functions and classes to operate with generic types using templates.
10. Construct a class in C++ to handle predefined and user defined exceptions

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	3		3				3	3	2	2	2	
2	3	2	3		3				3	3	2	2	3	
3	3	2	3		3				3	3	2	2	3	
4	3	2	3		3				3	3	2	2	3	
5	3	2	3		3				3	3	2	2	3	

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Semester III

Common to all Branches

Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
50 TP 0P1	**Career Competency Development I**	**0**	**0**	**2**	**0**	**100**	**00**	**100**
Course Objectives	• To help learners to enrich their grammatical correctness and vocabulary efficacy in the academic and professional contexts. • To help the learners to frame syntactical structures of sentences and comprehend the meaning of reading passages effectively • To help learners to adeptly sequence the information, draft letters and correct usage of foreign words with correct spelling and punctuation. • To help the learners to introduce themselves and involve in situation conversations professionally • To help learners to make various modes of presentations and express their opinion in a conducive way.							

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Course Outcomes	**At the end of the course, the student will be able to** CO1: Reinforce the essential grammatical correctness and vocabulary efficacy in the academic and professional contexts CO2: Generate syntactical structures and infer the semantics in the reading passages effectively CO3: Reorganize and compose the sequential information, letter drafts, and interpret the appropriate usage of foreign words with correct spelling and punctuation CO4: Demonstrate their introduction and relate to situational conversations adeptly CO5: Exhibit various modes of presentations and organize their opinions in an expressive way

Unit – 1	**Written Communication – Part 1**	**Hrs**
Usage of noun, pronoun, adjective (Comparative Forms), Verb, Adjectives, Adverb, Tenses, Articles and Preposition - Change of Voice - Change of Speech - Synonyms & Antonyms - One Word Substitution - Using the Same Word as Different Parts of Speech - Odd Man Out **Materials:** Instructor Manual, Word Power Made Easy Book		8
Unit – 2	**Written Communication – Part 2**	6
Analogies - Sentence Formation - Sentence Completion - Sentence Correction - Idioms & Phrases - Jumbled Sentences, Letter Drafting (Formal Letters) - Reading Comprehension (Level 1) - ContextualUsage - **Materials:** Instructor Manual, Word Power Made Easy Book		
Unit – 3	**Written Communication – Part 3**	4
Jumbled Sentences, Letter Drafting (Formal Letters) - Foreign Language Words used in English - -Spelling & Punctuation (Editing) **Materials:** Instructor Manual, News Papers		
Unit – 4	**Oral Communication – Part 1**	6
Self-Introduction - Situational Dialogues / Role Play (Telephonic Skills) - Oral Presentations-Prepared -'Just A Minute' Sessions (JAM) **Materials:** Instructor Manual, News Papers		
Unit – 5	**Oral Communication – Part 2**	6
Describing Objects / Situations / People, Information Transfer - Picture Talk - News Paper and BookReview **Materials:** Instructor Manual, News Papers		
	Total	**30**

Evaluation Criteria

S.No.	Particular	Test Portion	Marks
1	Evaluation 1 Written Test	50 Questions – 30Questions from Unit 1 & 2, 20 Questions from Unit 3, (External Evaluation)	50
2	Evaluation 2 Oral Communication 1	Self-Introduction, Role Play & Picture Talk from Unit-4 (External Evaluation by English and MBA Dept.)	30
3	Evaluation 3 Oral Communication 2	Book Review & Prepared Speech from Unit-5 (External Evaluation by English and MBA Dept.)	20
		Total	**100**

Reference Books

1. Aggarwal, R.S. “A Modern Approach to Verbal and Non-verbal Reasoning”, Revised Edition 2008, Reprint 2009, S.Chand& Co Ltd., New Delhi.
2. Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

Note:

- Instructor can cover the syllabus by Class room activities and Assignments (5 Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough work pages
- Each Assignment has 20 questions from Unit 1, 2 and Unit 5 and 5 questions from Unit 3 and 4 • Evaluation has to be conducted as like Lab Examination.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1						2			3	3		3	2	
2						2			3	3		3	2	2

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3						2		2	3	3		3		3
4						2			3	3		3	2	
5						2		2	3	3		3	3	2

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50 MA 011 - Discrete Mathematics								
Common to CS,IT								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P	60	C	CA	ES	Total
IV	3	1	0		4	50	50	100
Objective(s)	• To extend students logical and mathematical maturity and ability to deal with abstraction. • To familiarize computational thinking, critical thinking of combinatorics • To aware the applications of algebraic structures. • To know the challenge of the lattice theory to computer science and engineering problems • To understand the concepts of graph theory and related algorithm concept.							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Analyze the notion of mathematical, algorithmic thinking and be able to apply them in problems CO2: Compute the numbers of possible outcomes of elementary permutations and combinations CO3: Acquire the knowledge of algebraic techniques to analyze basic discrete structures and algorithms CO4: Interpret the statements presented in lattices CO5: Evaluate the knowledge of graphs and related discrete structures of network techniques							

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Mathematical Logic

Propositions-Connectives-Tautologies and contradictions – Equivalence of Propositions-Duality Law-Algebra of Propositions- Normal forms – Principal conjunctive and disjunctive normal forms – Theory of inference – Rules of inference- Form of arguments- Validity of arguments- Predicates –statement function-variables- Free and Bound Variables -Quantifiers- Universe of Discourse- Logical- Logical equivalences and implications for quantified statements. [9]

Combinatorics

Permutation- Combination- Pigeonhole Principle- Principle of Inclusion and Exclusion-Mathematical induction – Recurrence relations – generating functions. [9]

Algebraic Structures

Algebraic systems- Definitions- Examples- Properties- Semi groups- Monoids- Homomorphism – Sub semigroups and sub monoids- Cosets and Lagrange's theorem- Normal subgroups- Rings and Fields (Definitions and examples) [9]

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Lattices

Partial ordering- Poset- Hasse diagram- Lattices-Properties of lattices-Lattices as algebraic systems-Sub lattices-Direct product and Homomorphism- Some special lattices. [9]

Graph Theory

Introduction of Graphs – Degree –Complete graph –Regular graph –Bipartite graph- Subgraphs- Isomorphic graphs-Matrix Representation of graphs-Paths-Cycles-Connectivity- Eulerian and Hamiltonian walks - Planer Graphs - Graph Colouring - Colouring maps and - Colouring Vertices, Colouring Edges-Perfect Graph –Tree-Properties of trees-Spanning trees- Minimum spanning trees- Dijkstra's algorithm. [9]

Total Hours: 45 + 15(Tutorial) = 60 hours

Text book (s) :

1	K. H. Rosen, "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
2	J. P. Tremblay and R Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw–Hill Education Private Limited, New Delhi, 49th reprint 2016

Reference(s):

1	T. Veerarajan," Discrete Mathematics with Graph Theory and combinatorics" Fifth Reprint,Tata McGrawHill Publishing Company Limited.2008.
2	Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", Fourth Indian reprint, Pearson Education Pvt Ltd., New Delhi, 2003.
3	R. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, Delhi, 2007
4	S. Lipschutz and Mark Lipson, "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2	2							3	2	3
2	3	3	2	2	2							2	2	2
3	3	3	2	3	2							2	2	3
4	3	3	2	3	2							2	2	2
5	3	3	2	3	3							3	2	3

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50 IT 001 - Design and Analysis of Algorithms

Common to CS, IT

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	50	50	100

Objective(s)	• To design algorithms in both the science and practice of computing. • To choose the appropriate data structure and algorithm design method for a specified Application • To understand how the choice of data structures and algorithm design methods impacts the performance of programs. • To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound. • To solve NP-hard and NP-complete problems.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Classify the problem types and compare orders of growth to represent asymptotic notations. CO2: Apply and inspect recursive and non-recursive algorithms by mathematical notations using sample algorithms. CO3: Apply 'Brute Force' and 'Divide and conquer' design techniques for sorting and searching problems. CO4: Construct analogous algorithms for graph related problems. CO5: Apply 'Backtracking' and 'Branch and bound' techniques to solve NP-hard problems.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Basic Concepts of Algorithms

Introduction - Fundamentals of Algorithmic Problem Solving - Important Problem types -Fundamentals of the analysis of algorithm efficiency - Analysis Framework - Asymptotic Notations and Basic Efficiency Classes - Recurrence relations: Methods for solving recurrence relations [9]

Mathematical Analysis of Algorithms

Mathematical Analysis of Non-recursive Algorithms and Examples - Mathematical Analysis of Recursive Algorithms - Example: Fibonacci numbers - Empirical Analysis of Algorithms [9]

Brute Force and Divide & Conquer Techniques

Selection Sort and Bubble Sort - Brute-force string matching - Merge sort - Multiplication of Two n-Bit Numbers - Quick Sort - Binary Search - Binary tree Traversal and Related Properties [9]

Algorithm Design Paradigm

Decrease and Conquer Technique: Insertion Sort - Depth first Search and Breadth First Search – Transform and Conquer Technique: Presorting - Dynamic Programming: Computing a Binomial Coefficient - Warshall's and Floyd's Algorithm - The Knapsack Problem and Memory Functions - Optimal Binary Search trees – Greedy Technique**:** Huffman trees [9]

NP Hard and NP-Complete Problems

P and NP problems - NP complete problems - Backtracking: N-Queen's Problem - Hamiltonian Circuit problem Branch and Bound Techniques: Traveling salesman problem [9]

Total Hours : 45

Text book(s):

1. AnanyLevitin, "Introduction to the Design and Analysis of Algorithm", 3rdEdition, Tenth Impression, Pearson Education Asia, 2017.

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2.	T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, “Introduction to Algorithms”, 3rd Edition, PHI Pvt. Ltd., 2012.

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Reference(s):	
1.	Sara Baase and Allen Van Gelder, “Computer Algorithms - Introduction to Design and Analysis”, Pearson Education Asia, 2010.
2.	A.V.Aho, J.E. Hopcroft and J.D.Ullman, “The Design and Analysis of Computer Algorithms”, Pearson Education Asia, 2003.
3.	Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, “Computer Algorithms/ C++”, 2nd Edition, Universities Press, 2007.
4.	Anany Levitin, “Introduction To The Design & Analysis Of Algorithms”, 2nd Edition, PearsonEducation, 2011.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3		3								2	3	2
2	3	3		3								2	3	2
3	3	3	3	2	3							2	3	2
4	3	3	3	2								2	3	2
5	3	3	3	2	3							2	3	2

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50 CS 401 – Java Programming

CS

Semester	Hours / Week			Total Hrs	Credit	Maximum Marks		
	L	T	P	45	C	CA	ES	Total
IV	3	0	0		3	50	50	100

Objective(s)	• To cram the fundamental element of the Java language • To understand the concept of Collections, Streams, Packages and Exception handling, • To apply the knowledge of threads and to access remote data • To learn about regular expression and streams • To enhance the knowledge in server side programming and javaFx
Course Outcomes	**At the end of the course, the students will be able to** CO1: Express the concept of classes, objects and communicate classes over objects using methods CO2: Prompt the collection classes and observe predefined and user defined Exception handling CO3: Express the concept of thread execution with thread priority and to perform remote data access CO4: Practice the Regex and observe the streams concepts CO5: Design the concept server side programming also enrich the web concepts using JavaFX

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

JAVA FUNDAMENTALS

Fundamentals of OOPs – Java Features – Constants – Variables – Data types - Operators – Arrays – Strings – control statements – Class – object – methods [8]

COLLECTIONS and EXCEPTION HANDLING

Collections: Set, List, Vector and Map. Interfaces – Packages – Exception Handling. [11] **MULTI THREADING AND JAVA NETWORKING**

Multi threading - Java Thread model – Main thread – creating thread – creating multiple thread – Thread priority – methods – synchronization – IPC, RMI – Basics – RMI Layer – Stub, Skeleton - RMI Implementation. [8] **REGEX and STREAMS**

Regular Expression: Matcher Class, Pattern class and Pattern Syntax Exception class, Regex Character Classes and Quantifiers, Metacharacters. Streams: Generating streams, forEach, map, filter, limit, sorted, parallel processing and collectors. [9]

SERVLET and JavaFX

Server Side Programming; Servlet Architecture – Servlet Life cycle - Servlet Get and Post Method – Executing servlet. JavaFX: Architecture, 2D &3D Shapes, Animations, Colors, Text, UI Controls [9]

Total Hours : 45

Text book(s):

1. Herbert Schildt, "the Java 2: Complete Reference", Fifth edition, TMH, 2002.
2. M. Heckler, “JavaFX 8: Introduction by Example”, Second Edition, Apress.

Reference(s) :

1.	https://www.tutorialspoint.com,
2.	https://www.javatpoint.com,
3.	https://beginnersbook.com

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4.	https://www.journaldev.com,

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3		3				3	3	2	3	2	
2	3	3	3		3	2		2	3	3	2	3	3	2
3	2	3	3		3			2	3	3	2	3	3	2
4	3	3	3	2	3	2			3	3	2	3	3	2
5	2	3	3	2	3	2			3	3	2	3	3	

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50 CS 402 - Operating Systems

CS

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	50	50	100

Objective(s)

- This course provides the comprehensive knowledge on components of operating system with its working principles
- This course provides an ample way to identify and solve the issues related to operating system components
- To implement page replacement and disk scheduling algorithm
- To recognize various implementation of file systems
- To understand the storage management technniques

Course Outcomes

At the end of the course student will able to

CO1: Recognize the basics of system software, operating systems and its structures

CO2: Analyze the process scheduling and synchronization problem

CO3: Examine the deadlocks and memory management

CO4: Comprehend the file concepts and directory structure

CO5: Recognize the concepts of allocation methods and disk scheduling.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

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Introduction to Operating Systems

Introduction to system software: Assemblers-Loaders-Linkers-Compilers,Definition of Operating systems-Computer- system organization- Computer-system Architecture- Operating system structure- Operating system operations. System Structures:Operating system services-User and Operating-system Interface-System calls-Types of system calls-System programs [9]

Process Management

Process of OS:Process concept-Process scheduling-Operations on processes- Interprocess communication-Examples of IPC systems, Multithreaded programming: Overview-Multicore programming-Multithreading models-Threading issues, Process scheduling-Basic concepts-Scheduling criteria-Scheduling Algorithms, Synchronization: The critical section problem-Peterson's solution-Synchronization hardware- Mutex locks-Semaphores-Classic problems of synchronization-Monitors [10]

Deadlocks and Memory Management

Deadlocks: System model-Deadlock characterization-Methods for handling deadlocks-Deadlock prevention-Deadlock avoidance-Deadlock detection-Recovery from deadlock, Memory Management strategies:-Swapping-Contiguous memory allocation-Segmentation-Paging-Structure of the Page table, Virtual Memory Management:Background-Demand paging-Copy-on-write-Page replacement-Allocation of frames-Thrashing [10] **Storage Management**

File systems:File concept-Access methods-Directory and Disk structure-File-system mounting-File sharing-Protection [8]

File Management

Implementing file systems: File-system structure- File-system implementation-Directory implementationAllocation methods-Free-space management.

Mass storage structure**:** Overview of mass-storage structure-Disk structure - Disk attachment-Disk scheduling-Disk management-Swap-space management [8]

Total Hours : 45

Text book(s):

1	Abraham Silberschatz,Peter B Galvin, Gerg Gagne, "Operating System Concepts", Wiley India Pvt.Ltd.,2015,Ninth edition
2.	William Stallings, "Operating System: Internals and Design Principles", Prentice Hall of India, 6th Edition, 2009.

Reference(s):

1.	Leland L.Beck, "System Software-A Introduction to System Programming", 3rd Edition, Pearson Education, Sixth Impression 2009.
2.	Harvey M. Deitel, Paul J.Deitel and David R. Choffnes, "Operating Syatems", Prentice Hall of India, 3rd Edition, 2003.
3.	W Richard Stevens, Stephen A Rago, "Advanced Programming in the UNIX Environment"; 3/E, Addison Wesley Professional, 2013.
4.	A Tanenbaum,A Woodhull: "Operating Systems - Design and Implementation", 3/E, PHI EEE, 2006.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2									3	3	
2	3	3	3	3			2			2		2	3	2
3	3	3	3	3			2			2		2	3	
4	3	2	3									2	3	

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5	3	3	3	3			2					2	3	2

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50 CS 403 - Computer Architecture								
CS								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	50	50	100
Objective(s)	• To gain the knowledge about basic structure ,Instructions and functional units of a digital computer • Discuss in detail the operation of the arithmetic unit including the algorithms and implementation of data manipulation. • To study in detail the different types of control and the concept of pipelining and study the hierarchical memory system, cache memory • Study the different ways of communicating with I/O devices and standard I/O interfaces • To understand the instruction and thread level parallelism concepts and multicore processors.							
Course Outcomes	**At the end of the course student will able to** CO1: Describe the basic structure of computer, Instruction sequencing and Addressing modes. CO2: Express the basic design of Addition and subtraction for fixed point numbers, multiplication and division of fixed numbers and basics of floating point numbers CO3: Discuss the concept of Instruction execution, generation of control signals, pipelining and hazards. CO4: Summarize the concept of Cache memory and its performance, interrupts, buses, Direct Memory Access and Standard I/O Interfaces. CO5: Gain Knowledge about Parallelism concepts, compiler techniques, multiprocessor architecture and case studies on Intel's processors.							

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Basic Structure of Computers

Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues. [9]

Arithmetic Unit

Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations. [9] **Basic Processing Unit**

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control - Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation. [9]

Memory and I/O Systems

Speed,Size,Cost– Cache memories – Performance considerations – Accessing I/O Devices – Interrupts – Direct Memory Access – Buses– Interface Circuits– PCI,USB. [8]

Parallelism and Multiprocessors

Instruction Level Parallelism: ILP concepts – Pipelining overview - Compiler Techniques for Exposing ILP – Dynamic Branch Prediction – Dynamic Scheduling -Hardware Based Speculation – Static scheduling - Thread Level Parallelism: Symmetric and Distributed Shared Memory Architectures –Case studies: Intel core i7, Atom Processors [10]

Total Hours : 45

Text book(s):

1	Carl Hamacher, ZvonkoVranesic and SafwatZaky, 6th Edition "Computer Organization", McGraw-Hill, 2012.

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2.	David A.Patterson and John L.Hennessy, “Computer Organization and Design: The hardware / software interface”, 5th Edition, Morgan Kaufmann, 2014.

Reference(s):

1.	William Stallings, “Computer Organization and Architecture – Designing for Performance”, 9th Edition, Pearson Education, 2012.
2.	John P.Hayes, “Computer Architecture and Organization”, 3rd Edition, McGraw Hill, 2012.
3.	http://www.ni.com/white-paper/11266/en/#toc1
4.	https://techreport.com/review/15818/intel-core-i7-processors https://www.intel.in/content/www/in/en/products/processors/atom.html

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	2							2		2		2
2	3	3	2		2					2		2		2
3	3	3	2		2		2			2		2		2
4	2	2	2							2		2		2
5	3	2	2				2			2		2		2

K. S. Rangasamy College of Technology – Autonomous R2018								
50 CS 4P1 - Java Programming Laboratory								
CS								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	60	C	CA	ES	Total
IV	0	0	4		2	60	40	100
Objective(s)	• To enable the students to apply and solve the logical program • To apply the knowledge of library functions in java programming • To apply multithreading concepts in Java • To design server side programming • To design various level of graphics using JavaFX							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Demonstrate different operations using string and string buffer CO2: Implement the various classes and interfaces of Collections, packages and exception handling CO3: Demonstrate Inter Process Communication using threads and remote access using RMI CO4: Practice to solve the various scenario using regex and streams CO5: Perform server side programming using servlet and to perform javaFX							

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1. Implementation of different operations using string and string buffer
2. Demonstrate various classes and interfaces of Collections
3. Implementation of different applications using packages and to check abnormal conditions using exception handling.
4. Implementation of multi-tasking concepts using threads
5. Implementation of accessing remote data using RMI.
6. Implementation of innumerable tasks using regex and streams
7. Implementation of server programming using servlets.
8. Demonstrate the graphics applications using JavaFX

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3		3				3	3	2	3	2	
2	3	3	3		3	2		2	3	3	2	3	3	
3	2	3	3		3			2	3	3	2	3	3	
4	3	3	3	2	3	2			3	3	2	3	3	2
5	2	3	3	2	3				3	3	2	3	3	2

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K. S. Rangasamy College of Technology – Autonomous R2018								
50 CS 4P2 - Operating Systems Laboratory								
CS								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	60	C	CA	ES	Total
IV	0	0	4		2	60	40	100

Objective(s)	• To identify and solve the issues related to Operating System Components. • To learn different programming language in Linux editor environment • To implement different operating system algorithm • To implement the performance of different algorithms like CPU scheduling • To implement the performance of different algorithms like page replacement, deadlock avoidance and detection
Course Outcomes	**At the end of the course, the students will be able to** CO1: Learn the basics of Operating system installation and shell scripts and analyze the System calls for Process and inter process communications CO2: Examine the Steps in process operation and examine the criteria involved in CPU scheduling algorithms. CO3: Analyzing the different deadlock avoidance mechanism and implement Classic problem of Synchronization using semaphores CO4: Classifying the Storage Management and outline the page replacement algorithms CO5: comprehend the File concept and its allocations and understand the factors in disk scheduling algorithms

1. Installation of Operating system and implementation of Basic Shell Programming Concepts like Loops, Functions, Patterns, Substitutions.
2. Familiarization with System calls for Process and inter process communications.
3. Implement the operation on process.
4. Implement and analyze the scheduling criteria's of CPU Scheduling Algorithms.
5. Implement Deadlock avoidance mechanism from deadlock in a real time environment using C.
6. Implement Classic problem of Synchronization using semaphores.
7. Implement Contiguous Memory Allocation.
8. Implement Page replacement algorithm.
9. Implement various file allocation Methods.
10. Implement Disk Scheduling to find the seek time of accessing the required information using different Scheduling algorithm.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2						2			3	3	
2	3	3	3	3			2		2	2		2	3	2
3	3	3	3	3			2		2	2		2	3	
4	3	2	3									2	3	

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5	3	3	3	3			2					2	3	2

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Semester IV								
Common to all Branches								
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CA**	**ES**	**Total**
50 TP 0P2	**Career Competency Development II**	**0**	**0**	**2**	**0**	**100**	**00**	**100**

Course Objectives

- To help the learners to paraphrase the reading passages, to draft continuous writing and review texts in the academic and professional contexts
- To help the learners to acquire the phonetic skills of the language and express themselves precisely for effective professional presentations
- To help the learners to enrich their verbal reasoning and ability to match the employability requirements of the corporates
- To help the learners to comprehend the preliminary level of aptitude skills required to attend placement and competitive online exams
- To help the learners to comprehend the Pre - Intermediate level of aptitude skills required to attend placement and competitive online exams

Course Outcomes

At the end of the course, the student will be able to

CO1: Interpret and infer the meaning in the reading passages, organize continuous writing and review texts both academically and professionally.

CO2: Adapt to and demonstrate the phonetic skills accurately for effective presentations professionally.

CO3: Interpret the various concepts of verbal reasoning and relate for the concepts to the requirements of the competitive exams and employability

CO4: Infer the concepts of preliminary level of aptitude skills pertaining to competitive exams and company recruitments.

CO5: Infer the concepts of pre-intermediate level of aptitude skills pertaining to competitive exams and company recruitments.

Unit – 1	**Written Communication – Part 3**	**Hrs**
Reading Comprehension Level 2 (Paraphrasing Poems) - Letter Drafting - Email Writing - Paragraph Writing - Newspaper and Book Review Writing - Skimming and Scanning - Interpretation of Pictorial Representations. **Practices:** Sentence Completion - Sentence Correction - Jumbled Sentences - Synonyms & Antonyms - Using the Same Word as Different Parts of Speech - Editing **Materials:** Instructor Manual, Word power Made Easy Book, News Papers		6
Unit – 2	**Oral Communication – Part 3**	4
Self-Introduction - Miming (Body Language) - Introduction to the Sounds of English - Vowels, Diphthongs & Consonants, Introduction to Stress and Intonation - Extempore - News Paper and Book Review - Technical Paper Presentation. **Material:** Instructor Manual, News Papers		
Unit – 3	**Verbal Reasoning – Part 1**	8
Analogies - Alphabet Test - Theme Detection - Family Tree - Blood Relations (Identifying relationships among group of people) - Coding & Decoding - Situation Reaction Test - Statement & Conclusions **Material:** Instructor Manual, Verbal Reasoning by R.S.Aggarwal		
Unit – 4	**Quantitative Aptitude – Part 1**	6
Problem on Ages - Percentages - Profit and Loss - Simple & Compound Interest - Averages - Ratio, Proportion **Material:** Instructor Manual, Aptitude Book		
Unit – 5	**Quantitative Aptitude – Part 2**	

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Speed, Time & Work and Distance - Pipes and Cisterns - Mixtures and Allegations - Races - Problem on Trains - Boats and Streams **Practices** : Puzzles, Sudoku, Series Completion, Problem on Numbers **Material:** Instructor Manual, Aptitude Book	6
Total	**30**

Evaluation Criteria

S.No.	Particular	Test Portion	Marks
1	Evaluation 1 - Written Test	15 Questions Each from Unit 1, 3, 4 & 5(External Evaluation)	50
2	Evaluation 2 - Oral Communication	Extempore & Miming – Unit 2 (External Evaluation by English, MBA Dept.)	30
3	Evaluation 3 - Technical Paper Presentation	Internal Evaluation by the Dept.	20
		Total	**100**

Reference Books

1. Aggarwal, R.S. “A Modern Approach to Verbal and Non-verbal Reasoning”, Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2. Abhijit Guha, “Quantitative Aptitude”, TMH, 3rd edition
3. Objective Instant Arithmetic by M.B. Lal&GoswamiUpkar Publications.
4. Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

Note :

- Instructor can cover the syllabus by Class room activities and Assignments (5 Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough work pages • Each Assignment has 20 questions from Unit 1, 3, 4 and Unit 5 and 5 questions from Unit 2.
- Evaluation has to be conducted as like Lab Examination.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1									3	3		3	3	2
2									2	3		3	2	
3									3	3		3	2	2
4	3	2	2	2			1		3	3		3		2
5	3	2	2	2			1		3	3		3	3	

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50 CS 501 - Computer Networks

CS

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	50	50	100

Objective(s)

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

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Course Outcomes	**At the end of the course student will able to** CO1:Know the concept of components, categories and ISO/OSI model of networks CO2:Describe the Concept of various error detection techniques and Flow, Error control. CO3:Compare the concept of Circuit switching and Packet switching. CO4:Gain the knowledge of Congestion control and QoS Techniques. CO5: Identify the Purpose of Domain Name Space, Email and FTP.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

Data Communications

Networks – Components and Categories –Line Configuration – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media – Coaxial Cable – Fiber Optics –Interfaces(RS232 Standard) and Modems [9]

Data Link Layer

Error – detection and correction – Parity – LRC – CRC – Hamming code – Flow Control and Error control – Stop and wait – go back-N ARQ – selective repeat ARQ- sliding window – HDLC. - LAN - Ethernet IEEE 802.3 – Connecting devices-Repeaters-Hubs-Bridges [9]

Network Layer

Internetworks – Circuit Switching – Packet Switching– IP addressing methods – Sub netting –Super netting– Routers- Routing Algorithms – Distance Vector Routing – Link State Routing- ICMP / Frame format, Query Messages. [9]

Transport Layer

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS)-Techniques [9]

Application Layer

Domain Name Space (DNS) – Email (SMTP)-File Transfer protocol (FTP) – HTTP – HTTPS-World Wide Web.

Case Study: Structural Health Monitoring, Traffic Control, Health Care, Pipeline Monitoring, Precision Agriculture. [9]

Total Hours : 45

Text book(s):

1	Behrouz A. Forouzan, “Data communication and Networking Update ”, Tata McGraw-Hill, Third Edition , 2006.
2	Sudakshina Kundu, “Fundamentals of Computer Networks”, PHI, Second Edition.

Reference(s):

1	James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education, 2003
2	Larry L.Peterson and Peter S. Davie, “Computer Networks”, Harcourt Asia Pvt. Ltd., Second Edition.
3	Andrew S. Tanenbaum, “Computer Networks”, PHI, Fourth Edition, 2003.
4	William Stallings, “Data and Computer Communication”, Sixth Edition, Pearson Education, 2000

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	2									2		
2	3	3	3	2								2	3	2
3	3	3	3	2	3			3	3	3		2	3	2
4	3	3	3		2		2					2		2
5	3	2	3		2			2	2	2		2	2	

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50 CS 502 - Database Management Systems

CS

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	50	50	100

Objective(s)	• To familiarize the students with various data models and query language. • Gain knowledge on data storage and indexing concepts. • To expose the fundamentals of transaction processing and recovery concepts. • To make the students aware of the various current trends in database system. • To know the current trends of various databases
Course Outcomes	**At the end of the course student will able to** CO1: Express the knowledge of data base systems and analyze the various data models CO2: Employ the concept of Data Definition Language and Data Manipulation Language and apply the various Normal Forms in database design CO3: Express the knowledge of secondary storage device andthe concepts of hashing, B Tree,B+ Tree in indexing to retrieve the data CO4: Apply the various concurrency control techniques in database transactions and recovery techniques CO5: Classify the recent databases such and Express the knowledge of data warehousing and data mining

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction and Conceptual Modeling

Introduction Database systems – DBMS Applications – Purpose of DBMS – Views of Data - Database System Architecture –Data Storage and Querying – DB Users and Administrators - Data Models – ER model – Relational Model – Relational Algebra and Calculus. [9]

Relational Model

Introduction to SQL – Intermediate SQL – Advanced SQL– Triggers – Functions and Procedures –Embedded SQL - Normalization for Relational Databases (up to 5NF). [9]

Data Storage and Indexing Concepts

Record storage and Primary file organization –RAID – Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree. [9]

Transaction Management Transaction – Transaction Concepts- Transaction Model- Desirable properties of Transaction- Schedule and Recoverability- Serializability – Concurrency Control – Types of Locks- Two Phase locking- Time stamp based concurrency control – Recovery Techniques – Concepts- Immediate Update- Deferred Update. [9]

Current Trends Object Oriented Databases –Distributed databases- Homogenous and Heterogeneous- Distributed data Storage –Distributed Transaction – Commit Protocols - Data Mining– Data Mining Applications – Data Warehousing. [9]

Total Hours : 45

Text book(s):

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

Reference(s):

1.	Raghu Ramakrishnan, “Database Management System”, Tata McGraw-Hill Publishing Company, 2003.
2.	Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- “Database System Implementation”- Pearson Education- 2003.
3.	Peter Rob and Corlos Coronel- “Database System, Design, Implementation and Management”, Thompson Learning Course Technology- Fifth edition, 2003.

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4.	Rajiv Chopra, " Database Management System a Practical Approach ", S.Chand & co

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2		2	2	2		3			2		2
2	3	3	2		2	2	2		3			2	3	3
3	3	3	2		2								2	3
4	3	3	2		2	2	2		3					3
5	3	3	2		2	2	2							3

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50 CS 503 - Formal Language and Automata Theory

CS

Semester	Hours / Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	1	0	60	4	50	50	100

Objective(s)

- To understand the types of finite automata and the relationship between finite automata.
- To understand regular expressions, push down automata and context free grammar
- To understand the properties of context free language
- To learn the programming techniques of Turing machine and undecidable problems.
- To learn the concepts of Undecidability and interactable Problems.

Course Outcomes

At the end of the course student will able to

CO1: Comprehend the formal proofs, Inductive proofs and Finite Automata
CO2: Understand regular expressions and the properties of regular languages
CO3: Construction of context-free grammar and Push-down automata
CO4: Interpret the uses of Turing machine and properties of Context-Free Languages
CO5: Recognize the undecidability, and Interactable problems

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

Introduction to Automata

Introduction to formal proof – Additional forms of proof – Inductive proofs –Finite Automata (FA): Deterministic Finite Automata (DFA)– Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions. [6]

Regular Expressions and Languages

Regular Expression – Finite Automata and Regular Expressions – Properties of regular languages: Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata. [7]

Context-Free Grammar and Languages

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages [5] **Pushdown Automata**

Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and Context Free Grammars - Deterministic Pushdown Automata. [7]

Properties of Context-Free Languages

Normal forms for Context Free Grammars – Pumping Lemma for Context Free Languages - Closure Properties of Context Free Languages [5]

Turing Machines

The Turing Machines – Programming Techniques for Turing Machine. [6]

Undecidability

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post's Correspondence Problem [5]

Interactable Problems

The classes Polynomial Time (P) and Nondeterministic Polynomial Time(NP). [4]

Total Hours: 45+15(Tutorial)=60 Hours

Text book(s):

1	J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Third Edition, Pearson Education, 2008.
2	Anil Maheshwari Michiel Smid ," Introduction to Theory of Computation " School of Computer Science Carleton University ,2019

Reference(s):

1	Sipser Michael, "Introduction to the Theory of Computation", Third Edition, Thomson Press (India) Ltd.
2	J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, McGraw Hill Education, 2007.
3	H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pears Education/PHI, 2003
4	Karibasappa K.G. Basavaraj S.Anami , "Formal Languages and Automata Theory",first edition,wiley publisher,2011

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CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2					1			2		3	
2	3	3	2	2									3	
3	3	3	2					2			2	2	3	
4	3	3	2					2		1	2		3	
5	3	3	2					-		2		2	3	

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K.S. Rangasamy College of Technology – Autonomous R2018								
50 CS 504 - Web Technology								
CS								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	2	75	4	50	50	100

Objective(s)	• Enable the students to learn basic web concepts • To learn the concepts of scripting languages and server side programming • To apply the features of XML and JDBC Connectivity • To Write scripts in PERL and JSP • To make aware of the students about development in web technologies
Course Outcomes	**At the end of the course, the students will be able to** CO1: Express the features of HTML and Employ various style sheet concepts in HTML CO2: Describe the basics concepts of JavaScript and express various types events CO3: Analyzing the concepts of XML and JDBC CO4: Describe the purpose of PERL language and Gain the knowledge of JSP in server side programming CO5: Express the various types of applications

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

INTRODUCTION

Internet Basic - Introduction to HTML - List - Creating Table - Linking document - Frames - Graphics to HTML Doc - Style sheet - Style sheet basic - Add style to document - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties. [9]

JAVASCRIPT

introduction to Javascript - Advantage of Javascript - Javascript Syntax - Datatype - Variable - Array - Operator and Expression - Looping Constructor - Function - Dialog box – Events [9] **XML and JDBC**

Features of XML, The XML Declaration, Element Tags- Nesting and structure, XML text and text formatting element, Table element, Mark-up Element and Attributes, Document Type Definition (DTD),.XML Schema-Introduction-Jdbc Architecture-Types of Drivers-Statement-Result Set-Prepared Statement-Connection Modes-Save Point-Batch Updations –Callable Statement [10] **PERL AND JSP**

Programming CGI Scripts – PERL-Introduction-Jsp LifeCycle-Jsp Implicit Objects & Scopes- JspDirectives:page ,include,taglib-Jsp Scripting Elements: declaratives, scriptlets,e xpressions- JspActions :StandardAction ,Custom Actions-DataBaese Connectivity in JSP [10] **APPLICATIONS**

e-B usiness Models – Building an e-Business – e-Marketing – Database connectivity – Online Payments – Security - XML and e-Commerce – m-Business. [9]

Practice:

1. Design a personal web page using CSS
2. Write a Java Script program which makes use of Java Script's inbuilt objects
3. Design web page for employee details using XML with database connectivity
4. A web page using PERL
5. Write a JSP program to implement Students mark Statements with database connectivity

Total Hours: 45+30=75 hours

Text book(s):

1. H.M.Deitel, P.J.Deitel, A.B.Goldberg, “INTERNET and WORLD WIDE WEB – How to program”, Pearson education, Third Edition, 2004..
2. Haggit Attiya and Jennifer Welch, —Distributed Computing – Fundamentals, Simulations and Advanced Topics‖, Second Edition, Wiley, 2012.

Reference(s) :

1. D.Norton and H. Schildt, “Java 2: The complete Reference”, TMH, 2000.
2. Eric Ladd and Jim O’Donnell, et al, “USING HTML 4, XML, and JAVA1.2”, PHI publications, 2003.
3. Jeffy Dwight, Michael Erwin and Robert Nikes “USING CGI”, PHI Publications, 1997.

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4.	N. P. Gopalan," Web Technology: A Developer's Perspective", 2nd edition PHI Learning 2014

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	3		3				3	3	2	3	3	
2	3	2	3		3				3	3	2	3	3	
3	3	2	3		3				3	3	2	3	3	
4	3	2	3		3				3	3	2	3	3	
5	3	2	3		3				3	3	2	3	3	

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50 CS 5P1 - Networking Laboratory							
CS							
Semester	Hours / Week			Total hrs	Credit	Maximum Marks	
	L	T	P	60	C	CA	ES	Total
V	0	0	4		2	60	40	100

Objective(s)	• To learn and use network commands. • To learn socket programming. • To implement and analyze various network protocols • To learn and use simulation tools. • To use simulation tools to analyze the performance of various network protocols
Course Outcomes	**At the end of the course, the students will be able to** **CO1:** Implement various protocols using TCP and UDP. **CO2:** Compare the performance of different transport layer protocols. **CO3:** Use simulation tools to analyze the performance of various network protocols. **CO4:** Analyze various routing algorithms. **CO5:** Implement error correction codes.

1. Learn to use commands like tcp dump ,netstat, ifconfig, nslookup and trace route Capture ping and trace route PDU using a network protocol analyze rand examine.
2. Write a HTTP web client program to download a webpage using TCP sockets.
3. Applications using TCP sockets like:
   i) Echo client and echo server
   ii) Chat iii) File Transfer
4. Simulation of DNS using UDP sockets.
5. Write a code simulating ARP /RARP protocols.
6. Study of Network simulator(NS)and Simulation of Congestion Control Algorithms using NS2
7. Study of TCP/UDP performance using Simulation tool.
8. Simulation of Distance Vector/Link State Routing algorithm.
9. Performance evaluation of Routing protocols using Simulation tool.
10. Simulation of error correction code (like CRC).

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	2	2				2	2		2	2	
2	3	3	3	2	2				2	2		3	2	2
3	3	3	3	3	3				2	2		2	3	2
4	3	3	3	3	2				2	2		3	3	2
5	3	3	3	2	2				2	2		3	2	

K.S. Rangasamy College of Technology – Autonomous							
50 CS 5P2 Database Management Systems Laboratory							
CS							
Semester	Hours / Week			Total hrs	Credit	Maximum marks	
	L	T	P	60	C	CA	ES	Total
V	0	0	4		2	60	40	100

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BoS Chairman

Objectives	• To present SQL and procedural interfaces to SQL comprehensively • To perform various commands in RDBMS • To Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Triggers • To design the applications like payroll • To apply procedures and functions in PL/SQL
Course Outcomes	**At the end of the course, the students will be able to** CO1: Implement the Data Definition Language, Data Manipulation Language and Data Control Language commands in RDBMS CO2: Employ the Sub queries to retrieve data from multiple tables CO3: Implement the High-level language extension with Cursors and Triggers CO4: Implement the Procedures and Functions in PL/SQL CO5: Demonstrate the views, joins and Embedded SQL in RDBMS

List of Experiments

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML), Data Control Language (DCL) and Transaction Control Language (TCL) commands in RDBMS.
3. Implementation of Sub queries.
4. Creation of views and joins.
5. High-level language extension with Cursors. 6. High level language extension with Triggers
7. Procedures and Functions.
8. Embedded SQL.
9. Design and implementation of Payroll Processing System.
10. Design and implementation of Banking System.
11. Design and implementation of Railway Reservation System.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3		3	2	2		3	3		3	2	2
2	3	3	3		3	2	2		3	3		3	2	2
3	3	3	3		3	2	2		3	3		3	2	2
4	3	3	3		3	2	2		3	3		3	2	2
5	3	3	3		3	2	2		3	3		3	2	2

K.S.Rangasamy College of Technology - Autonomous R 2018								
Semester V								
Common to all Branches								
Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
50 TP 0P3	Career Competency Development III	0	0	2	0	100	00	100

Passed in BoS Meeting held on 22/12/2022
Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman

Course Objectives	• To help the learners to enrich the written and oral communication skills in the academic and professional contexts • To help the learners to enrich their verbal and logical reasoning ability to meet out the employability requirements of the companies • To help the learners to comprehend the Intermediate level of aptitude skills required to attend placement and competitive online exams • To help the learners to enhance their knowledge in the quantitative aptitude skills in algebraic and linear equations. • To help the learners to augment the core technical and coding skills of their respective domains to compete in coding contests
Course Outcomes	**At the end of the course, the student will be able to** CO1: Examine the written and oral communication skills in the academic and professional contexts CO2: Interpret the concepts of verbal reasoning and relate for the concepts to the requirements of the competitive exams and employability CO3: Infer the concepts of intermediate level of aptitude skills pertaining to competitive exams and company recruitments. CO4: Assess their comprehension in the quantitative aptitude skills in algebraic and linear equations. CO5: Review the core technical and coding skills of their respective domains to compete in coding contests

Unit – 1	Written and Oral Communication – Part 1	Hrs
Reading Comprehension Level 3 - Self Introduction - News Paper Review - Self Marketing - Debate- Structured and Unstructured GDs Psychometric Assessment – Types & Strategies to answer the questions **Practices:** Sentence Completion - Sentence Correction - Jumbled Sentences - Synonyms & Antonyms - Using the Same Word as Different Parts of Speech - Interpretation of Pictorial Representations - Editing - GD - Debate. **Materials:** Instructor Manual, Word power Made Easy Book, News Papers		6
Unit – 2	Verbal & Logical Reasoning – Part 1	
Syllogism - Assertion and Reasons - Statements and Assumptions - Identifying Valid Inferences - identifying Strong Arguments and Weak Arguments - Statements and Conclusions - Cause and Effect - Deriving Conclusions from Passages - Seating Arrangements. **Practices:** Analogies - Blood Relations - Statement & Conclusions. **Materials:** Instructor Manual, Verbal Reasoning by R.S.Aggarwal		8
Unit – 3	Quantitative Aptitude – Part 3	
Probability - Calendar- Clocks - Logarithms - Permutations and Combinations **Materials:** Instructor Manual, Aptitude Book		6
Unit – 4	Quantitative Aptitude – Part 4	
Algebra - Linear Equations - Quadratic Equations – Polynomials. **Practices:** Problem on Numbers - Ages - Train - Time and Work - Sudoku – Puzzles. **Materials:** Instructor Manual, Aptitude Book		6
Unit – 5	Technical & Programming Skills – Part 1	
Core Subject – 1,2 3 **Practices:** Questions from Gate Material. **Materials:** Text Book, Gate Material		4
	Total	30

Evaluation Criteria

S.No.	Particular	Test Portion	Marks
1	Evaluation 1 Written Test	15 Questions each from Unit 1, 2, 3, 4 & 5 (External Evaluation)	50
2	Evaluation 2 - Oral Communication	GD and Debate (External Evaluation by English, MBA Dept & External Trainers)	30
3	Evaluation 3 – Technical Paper Presentation	Internal Evaluation by the Dept.	20
		Total	**100**

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Reference Books

1. Aggarwal, R.S. "A Modern Approach to Verbal and Non-verbal Reasoning", Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2. Abhijit Guha, "Quantitative Aptitude", TMH, 3rd edition
3. Objective Instant Arithmetic by M.B. Lal & GoswamiUpkar Publications.
4. Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

Note :

- Instructor can cover the syllabus by Class room activities and Assignments (5 Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough work pages
- Each Assignment has 20 Questions from Unit 1,2,3,4 and 5 and 5 Questions from Unit 1 • Evaluation has to be conducted as like Lab Examination.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1									3	3	2	3	1	2
2									3	3	3	3	2	2
3	3	2	2	2			1		3	3		3		2
4	3	2	2	2			1		3	3		3	3	
5	3	2	2	2	3	2		2	3	2		3	3	3

K.S. Rangasamy College of Technology – Autonomous R2018

50 CS 601 – Python Programming

CS

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	50	50	100

Objective(s)

- To know basic programming in Python
- To understand modular design along with exception handling
- To apply object-oriented programming concepts in python
- To develop the ability to write database programming and network programming in python
- To develop the skill of designing Graphical user Interfaces in Python

Course Outcomes

At the end of the course, the students will be able to

CO1: Apprehend the basics of Python programming

CO2: Expel modules and functions with various types of message passing and handling exceptions

CO3: Acquire and implement OOP concepts using Python

CO4: Understand DB connectivity and network programming using Python

CO5: Understand GUI toolkits like Tkinter and configure various widgets in layout

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

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INTRODUCTION TO PYTHON

Introduction to Python –Strings –List–Tuples –Dictionaries–Basic Operators–Decision Making statements –Looping statements -File Input and Output [09]

MODULAR DESIGN AND EXCEPTION HANDLING

Modules in Python –Creation of modules -Namespaces –Importing modules –Loading and Execution ; Program Routine –Functions –Parameter Passing -Types –Recursion ; Exceptions –Types –Handling Exceptions-User Defined Exceptions-Pandas. [09]

OBJECT ORIENTED PROGRAMMING

Object Oriented Programming –Class and Objects –Data Abstraction -Encapsulation –Inheritance –Polymorphism –Implementation. [09]

DATABASE CONNECTIVITY AND NETWORK PROGRAMMING

Introduction to database –Relational Databases : Writing SQL statements; Defining tables; Setting up a Database – Python database APIs –Network Protocols –Socket Programming –Client Server Program –Chat Application. [09]

GUI PROGRAMMING AND GRAPHICS

GUI Programming toolkits –Introduction to Tkinter –Creating GUI widgets –Resizing –Configuring widget options – Creating Layouts –Radio buttons –Check boxes –Dialog boxes –Drawing using Turtle. [09]

Total Hours : 45

Text book(s):

1	James Payne, —Beginning Python –using Python 2.6 and Python 3.1, Wiley India Pvt Ltd, 2010
2	Charles Dierbach, —Introduction to Computer Science using Python, Wiley India Pvt Ltd, 2015

Reference(s):

1	Timothy A. Budd 'Exploring Python' – TATA McGRAW-HILL Edition – 2011
2	Mark Summerfield , “Programming in Python 3”, 2nd ed (PIP3) , Addison Wesley ISBN: 0-321-68056-1
3	Martin C. Brown, “Python: The Complete Reference (English)”, McGraw-Hill/Osborne Media, 2001.
4	Mark Pilgrim, “Dive Into Python”, Apress, 2004
5	Hetland., “Beginning Python” , Apress, 2008
6	Nptel course, The Joy of Computing using Python, https://onlinecourses.nptel.ac.in/noc18_cs35/preview

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	3		3				3	3		3	2	
2	3	3	3		3				3	3		3	2	3
3	3	3	3		3	2			3	3		3	3	2
4	3	3	3		3	2	2		3	3		3	3	3
5	3	3	3		3				3	3		3	3	

K.S. Rangasamy College of Technology – Autonomous R2018							
50 CS 602 - Principles of Compiler Design							
CS							
Semester	Hours / Week			Total hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
VI	3	1	0	60	4	50	50	100

Passed in BoS Meeting held on 22/12/2022

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

BoS Chairman

Objective(s)	• Understand the fundamentals of lexical analysis phase of compiler • Discuss syntactic analysis functionalities of compiler • Identify the processes involved in intermediate code generation • Explain issues code generation phase of compiler • Describe optimization techniques
Course Outcomes	**At the end of the course, the students will be able to** CO1: Understand the basics of compilers and describe phases of compilers CO2: Interpret the major role played by syntax analysis CO3: Explain the processes involved in intermediate code generation CO4: Summarize the major processes involved in code generation. CO5: Illustrate the features of code optimization.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

COMPILER AND LEXICAL ANALYSIS

Introduction to Compilers-Structure of compiler -The phases of compiler – Cousins of compiler -The grouping of phases-Compiler construction tools. The role of the lexical analyzer- Input Buffering –Specification of Tokens – Recognition of Tokens [9]

SYNTAX ANALYSIS

The role of the parser-Context-free grammars-Writing a grammar-Top down parsing- Recursive Descent Parser - Predictive Parser-LL(1) Parser-Bottom-up Parsing- Shift Reduce Parser-LR parsers-SLR parser – Canonical LR parser –LALR Parser. [9]

INTERMEDIATE CODE GENERATION

Intermediate languages –Three-Address Code –Types and Declarations –Translation of Expressions –Rules for Type Checking and Type Conversions –Control Flow –Back patching –Switch Statements –Procedures.[9]

CODE GENERATION

Issues in the Design of a Code Generator –Target Language –Addresses in the Target Code –Basic Blocks and Flow Graphs –Optimization of Basic Blocks –A Simple Code Generator. [9] **CODEOPTIMIZATION**

Code Optimization –Principal Sources of Optimization-Peephole Optimization-Introduction to Data Flow Analysis –Run Time Environments –Storage Organization –Stack Allocation of Space –Access to Non-Local Data on the Stack. [9]

Total Hours: 45 + 15 hours

Text book(s):

1.	Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers Principles, Techniques and Tools”, Second Edition, Pearson Education, 2011.
2.	Santanu Chattopadhyay “ Compiler Design “ sixth edition , PHI learning,2011

Reference(s) :

1.	David Galles, “Modern Compiler Design”, Pearson Education Asia, 2007
2.	Allen I. Holub, “Compiler Design in C”, Prentice Hall of India, 2003.
3.	C. N. Fisher and R. J. LeBlanc “Crafting a Compiler with C”, Benjamin Cummings, 2003.
4.	J.P. Bennet, “Introduction to Compiler Techniques”, Second Edition, Tata McGraw-Hill, 2003.
5.	Nptel course, Compiler Design, https://onlinecourses.nptel.ac.in/noc19_cs01/preview

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	3		2					2			2	3
2	2	3	3		2		2			2		2	2	3
3	2	3	3		2					2		2	2	3
4	2	3	3		2		2			2		2	2	3

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5	2	3	3		2		2			2		2	2	3

K.S. Rangasamy College of Technology – Autonomous R2018								
51 CS 603 – Software Testing								
CS								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	50	50	100
Objective(s)	• To explain the basics of software testing. • To highlight the strategies for software testing. • To stress the need and conduct of testing levels. To identify the issues in testing management. • To bring out the ways and means of controlling and monitoring testing activity • To study about Automation testing and tools							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Interpret the basic concepts of Software testing, defects, verification and validation CO2:Analyze the functional requirements of the system and the use of conducting the review CO3: Infer the need of testing techniques for White box, Basis path, Black box and Control structure testing. CO4: Classify different strategic approaches and types in software testing. CO5: Learn about Automation Testing tools and implement the guidelines to generate test cases design.							

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction to Testing

Software Testing – Definition of Software Testing – Objective and Limits of Testing –Principles of Software Testing- Software Testing Life Cycle- Testing Strategy – Roles and Responsibilities of a Software Tester in Organizations –Origins of Defects – Cost of Defects – Independent Verification and Validation. [9] **Software testing Requirements**

Software Testing Requirements - Analyzing the requirements -Classifying the Functional and Non Functional Requirements with their types. Software Testing Review Process - Objective of Software Testing Review - Types of Reviews - Peer Review, Walkthrough, Inspection - Checklists of Review Process - Review Log. [9] **Testing Techniques**

White Box Testing Techniques – Static and Dynamic Testing – Statement Coverage – Decision Coverage – Basic Path Testing – Control Flow Graph Coverage – Branch Coverage – Conditional Coverage – McCabe's Cyclomatic Complexity – Mutation Testing. Black Box Test Techniques – Boundary Value Analysis – Equivalent Class Partition -Error Guessing – Decision Table – State Transition Table – Pair Wise Testing – UseCase Testing. [9]

Testing Types

Unit Testing – Smoke Testing – Functional Testing and its Types – Integration, System Testing, User Acceptance Testing (Alpha and Beta)- Non Functional Testing and its Types – Performance Testing (Load, Volume and Stress)- Recovery Testing, Browser Compatibility Testing – Security Testing – Scalability Testing – Usability Testing – Ad Hoc Testing – Internationalization Testing – Configuration Testing - Data warehouse Testing and Business Intelligence Testing **–**Mobile Testing. [9]

Automation Tools and Test Cases

Software Test Automation – Scope of Automation - Design and Architecture for Automation – Automation Testing using Selenium Tool – Definition of Test Case – Standard, Guidelines and Naming Conventions for Test Case Design – Characteristics of Good Test Cases and its templates – Creation of Test Case Requirement Coverage – Traceability Matrix – Test Case Review Process – Test Execution – Test Log – Reporting of Test Execution – Risk Based Testing Approach. [9]

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Total Hours: 45	
Text book(s):	
1.	S.Subashni, N.Sathees Kumar, Dr.B.G.Geetha, Dr.G.Singaravel, ”Software Testing”, Umayam Publications , 1st edition ,2013.
2.	Mauro pezze,Michal young, “Software Testing and Analysis: Process, Principles, and Techniques”,Wiley,2008 edition.
Reference(s) :	
1.	Marnie L.Hutchson, “Software Testing Fundamentals Methods and Metrics”,Wiley,2003 edition.
2.	Edward Kit, “Software Testing in the Real World – Improving the Process”, Pearson Education, New Delhi, 1995.
3.	S Limaye, Software Testing Principles, Techniques and Tools, McGraw Hill, 2009.
4.	Renu Rajani and Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw-Hill, New Delhi, 2003.
5.	https://www.softwaretestinghelp.com/cucumber-bdd-tool-selenium-tutorial-30/
6.	Rex black, Dorothy graham and Erik van Veenendaal “Foundation of Software Testing ISTQB certification”, Third edition, Cengage Learning.
Online Courses	
1.	http://www.tcs.com/SiteCollectionDocuments/WhitePapers/AFrameworkforAutomatingTestingofNetworkingEquipment.pdf
2.	https://onlinecourses.nptel.ac.in/noc17_cs32/preview
3.	https://www.coursera.org/learn/ruanjian-ceshi
4.	https://www.coursera.org/learn/software-processes

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3					3		2			3	
2	3	3	3				2						3	
3	3	2	2		3							3	3	
4	3	3		3	3			2					3	
5	3	2	3		3							3	3	

K.S.Rangasamy College of Technology – Autonomous R2018								
50 MY 014 – Start-ups and Entrepreneurship								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	0	30	-	100	-	100
Objective(s)	• To provides practical proven tools for transforming an idea into a product or service that creates value for others. • To build a winning strategy, how to shape a unique value proposition, prepare a business plan • To impart practical knowledge on business opportunities • To inculcate the habit of becoming entrepreneur • To know the financing, growth and new venture & its problems							

Passed in BoS Meeting held on 22/12/2022
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Course Outcomes	**At the end of the course, the student will be able to** CO1: Transform ideas into real products, services and processes, by validating the idea, testing it, and turning it into a growing, profitable and sustainable business. CO2: Identify the major steps and requirements in order to estimate the potential of an innovative idea as the basis of an innovative project. CO3: Reach creative solutions via an iteration of a virtually endless stream of world-changing ideas and strategies, integrating feedback, and learning from failures along the way. CO4: Apply the 10 entrepreneurial tools in creating a business plan for a new innovative venture. CO5: Apply methods and strategies learned from interviews with startup entrepreneurs and innovators.

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

Introduction to Entrepreneurship & Entrepreneur

Meaning and concept of Entrepreneurship, the history of Entrepreneurship development, Myths of Entrepreneurship, role of Entrepreneurship in Economic Development, Agencies in Entrepreneurship [6]

Management and Future of Entrepreneurship.

The Entrepreneur*:* Meaning, the skills required to be an entrepreneur, the entrepreneurial decision process, Role models, Mentors and Support system.

Business Opportunity Identification and Preparing a Business Plan

Business ideas, methods of generating ideas, and opportunity recognition, Idea Generation Process, [6] Feasibility study, preparing a Business Plan: Meaning and significance of a business plan, components of a business plan.

Innovations

Innovation and Creativity - Introduction, Innovation in Current. Environment, Types of Innovation, School of Innovation, Analysing the Current Business Scenario, Challenges of Innovation, Steps of Innovation [6]

Management, Experimentation in Innovation Management, Participation for Innovation, Co-creation for Innovation, Proto typing to Incubation. Blue Ocean Strategy-I, Blue Ocean Strategy-II. Marketing of Innovation, Technology Innovation Process

Financing & Launching the New Venture

Importance of new venture financing, types of ownership, venture capital, types of debt securities, determining ideal debt-equity mix, and financial institutions and banks. [6]

Launching the New Venture: Choosing the legal form of new venture, protection of intellectual property, and formation of the new venture

Managing Growth & Rewards in New Venture

Characteristics of high growth new ventures, strategies for growth, and building the new ventures. [6]

Managing Rewards: Exit strategies for Entrepreneurs, Mergers and Acquisition, Succession and exit strategy, managing failures – bankruptcy

Total Hours 30

Text book(s):

1.	Stephen Key, “One Sim$_{st}$ ple Idea for Startups and Entrepreneurs: Live Your Dreams and Create Your Own Profitable Company” 1 Edition, Tata McGrawhill Company, New Delhi, 2013.
2.	“ ”, 2^{n} Edition, Tat^{d}a McGrawhill Company, New Delhi, 2016.

Reference(s) :

1	Philip Auerswald, “The Coming Prosperity: How Entrepreneurs Are Transforming the Global Economy”, Oxford University Press, 2012.

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2	Janet Kiholm Smith; Richard L. Smith; Richard T. Bliss, “Entrepreneurial Finance: Strategy, Valuation, and Deal Structure, Stanford Economics and Finance”, 2011
3	Edward D. Hess, “Growing an Entrepreneurial Business: Concepts and Cases”, Stanford Business Books, 2011
4	Howard Love, “The Start-Up J Curve: The Six Steps to Entrepreneurial Success”, Book Group Press, 2011

Charles Bamford and Garry Bruton, ENTREPRENEURSHIP: The Art, Science, and Process for Success

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	1	3	1	2	1		2	2		
2	2	3	3	2	2		2	2	2		2	2		
3	3	2	3	1	2				1	3	1	3		
4	3	3	3	3	3	2	2	1		1	3	3		
5	3	2	3	3	3			2			3	2		

Passed in BoS Meeting held on 22/12/2022
Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2018								
50 CS 6P1–Python Programming Laboratory								
CS								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	0	0	4	60	2	60	40	100
Objective(s)	• To gain the fundamental skills in Python programming Language • To understand the concepts modular design and • To implement the object oriented programming • To enhance the knowledge in database connectivity , networking • To develop the programs in GUI							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Know the basic concepts of Python CO2: Understand the modular design and exception handling CO3: Ability to develop programs on object oriented concepts CO4: Implement the data base connectivity and network programming CO5: Integrate the concept of GUI programming and Graphics							

LIST OF EXPERIMENTS

1. Implement the basic concepts of Python
2. Implement List, string and Tuples
3. Implement the concept of Decision making and looping statements.
4. Implement File operations
5. Build models using object oriented concepts
6. Build models using database connectivity
7. Build model using network programming
8. Build model using GUI 9. Drawing using Turtle
10. Mini project to predict the time taken to solve a problem given the current status of the user.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	3		3				3	3		3	2	
2	3	3	3		3				3	3	2	3	2	3
3	3	3	3		3	2			3	3	2	3	3	2
4	3	3	3		3	2	2		3	3	2	3	3	3
5	3	3	3		3				3	3	2	3	3	

K.S. Rangasamy College of Technology – Autonomous R2018				
51 CS 6P2– Open Source Systems Laboratory				
CS				
Semester	Hours / Week	Total hrs	Credit	Maximum Marks

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BoS Chairman

	L	T	P		C	CA	ES	Total
VI	1	0	2	45	2	60	40	100

Objective(s)	• To study the basic concepts of MYSQL. • To discover the PHP operators and functions. • To apply the knowledge of string handling functions in PHP. • To expand knowledge of MYSQL database connectivity and file handling functions in PHP.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Interpret the concepts of MYSQL and its record selection technologies. CO2: Demonstrate the basic concepts and developing a simple application using PHP operators and Functions. CO3: Exhibit the string handling functions in PHP. CO4: Demonstrate the MYSQL database connectivity. CO5: Demonstrate the file handling functions in PHP.

1. Connecting the MYSQL database and perform the following
   a. Creating and Deleting Database.
   b. Creating a Table.
   c. Examining the Results.
   d. Inserting / Retrieving Data into / from Tables.
2. a. Selecting Specific Rows and Columns.
   b. Deleting and Updating Rows.
   c. Loading a Database from a File.
3. PHP program that displays a welcome message
4. PHP program to implement Simple data storage, operators and Functions.
5. PHP script implements string handling functions.
6. PHP Script that implements the database connectivity.
7. PHP scripts that implement the following file handling operations
   i. Reading data from the file ii. Writing data to the file iii. Printing all the records.
8. Write a PHP script to add the Rollno, name, six subjects' marks into Mark table in MySQL and display the average and result

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	3	2	3				3	2			3	
2	3	2	3	2	3	2	2		3	2			3	
3	3	2	3		3	2			3	2		3	3	
4	3	2	3		3			3	3	2		3	3	3
5	3	2	3	2	3	2	2	3	3	2		3	3	3

Passed in BoS Meeting held on 22/12/2022
Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman

Semester VI								
Common to all Branches								
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CA**	**ES**	**Total**
50 TP 0P4	**Career Competency Development IV**	**0**	**0**	**2**	**0**	**100**	**00**	**100**

Course Objectives	• To help the learners to enrich the advanced written and oral communication skills in the academic and professional contexts • To help the learners to augment their advanced verbal and logical reasoning ability to meet out the employability requirements of the companies • To help the learners to comprehend the advanced level of aptitude skills in the concepts of Geometry • To help the learners to enhance the data interpretation and analytical skills in varied methods. • To help the learners to enrich the technical and programming skills to be focused on better employability, codeathons and hackathons
Course Outcomes	**At the end of the course, the student will be able to** CO1: Examine and correlate the written and oral communication skills in the academic and professional contexts CO2: Predict and discriminate advanced verbal and logical reasoning ability to meet out the employability requirements of the companies CO3: Infer the concepts of advanced level of aptitude skills on Geometry pertaining to competitive exams and company recruitments. CO4: Illustrate the data interpretation and analytical skills in varied methods. CO5: Formulate the technical and programming skills to be focused on better employability, codeathons and hackathons

Unit – 1	Written and Oral Communication – Part 2	Hrs
Self-Introduction – GD – Personal Interview Skills **Practices** on Reading Comprehension Level 2 – Paragraph Writing – Newspaper and Book Review Writing – Skimming and Scanning – Interpretation of Pictorial Representations – Sentence Completion-Sentence Correction – Jumbled Sentences – Synonyms & Antonyms – Using the Same Word as Different Parts of Speech – Editing. **Materials:** Instructor Manual, Word power Made Easy Book, News Papers		4
Unit – 2	Verbal & Logical Reasoning – Part 2	8
Analogies – Blood Relations – Seating Arrangements – Syllogism – Statements and Conclusions, Cause and Effect – Deriving Conclusions from Passages – Series Completion (Numbers, Alphabets & Figures) – Analytical Reasoning – Classification – Critical Reasoning **Practices**: Analogies – Blood Relations – Statement & Conclusions. **Materials:** Instructor Manual, Verbal Reasoning by R.S.Aggarwal		
Unit – 3	Quantitative Aptitude – Part – 5	6
Geometry – Straight Line – Triangles – Quadrilaterals – Circles – Co-ordinate Geometry – Cube – Cone – Sphere. **Materials:** Instructor Manual, Aptitude book		
Unit – 4	Data Interpretation and Analysis	6
Data Interpretation based on Text – Data Interpretation based on Graphs and Tables. Graphs can be Column Graphs, Bar Graphs, Line Charts, Pie Chart, Graphs representing Area, Venn Diagram & Flow Charts. **Materials:** Instructor Manual, Aptitude Book		
Unit – 5	Technical & Programming Skills – Part 2	6
Core Subject – 4, 5, 6 **Practices:** Questions from Gate Material. **Materials:** Text Book, Gate Material		
	Total	30
Evaluation Criteria		

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S.No.	Particular	Test Portion	Mark s
1	Evaluation 1 Written Test	15 Questions each from Unit 1, 2, 3, 4 & 5 (External Evaluation)	50
2	Evaluation 2 – Oral Communication	GD and HR Interview (External Evaluation by English, MBA Dept.)	30
3	Evaluation 3 – TechnicalInterview	Internal Evaluation by the Dept. – 3 Core Subjects	20
		Total	100

Reference Books

1. Aggarwal, R.S. "A Modern Approach to Verbal and Non-verbal Reasoning", Revised Edition 2008, Reprint 2009,S.Chand & Co Ltd., New Delhi.rd
2. Abhijit Guha, "Quantitative Aptitude", TMH, 3 edition
3. Objective Instant Arithmetic by M.B. Lal & GoswamiUpkar Publications.
4. Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

Note:

- Instructor can cover the syllabus by Class room activities and Assignments (5 Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough Work pages
- Each Assignment has 20 questions from Unit 1,2,3,4,5 and 5 questions from Unit 1(OralCommunication) & Unit 5(Programs)
- Evaluation has to be conducted as like Lab Examination.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1									3	3	2	3	1	2
2									3	3	3	3	2	2
3	3	2	2	2			1		3	3		3		2
4	3	3	2	3	2	1			3	2	3	3	3	3
5	3	2	2	2	3	2		2	3	2		3	3	3

K. S. Rangasamy College of Technology – Autonomous R2018								
50 HS 001 - Engineering Economics and Financial Accounting								
Common to all Branches								
Semester	**Hours / Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100
Course Objective(s)	• To make the Engineering student to know about the basic of economics & how to organize a business • To know the financial aspects related to business. • To know about functions of banks. • To understand the different methods of appraisal of projects and • To know about the pricing & capital techniques.							

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Course Outcome s	**At the end of the course, the students will be able to** CO1: Identify suitable demand forecasting techniques and prevailing market structure CO2: Describe the forms of business and differentiate between proprietorship and partnership CO3: Explain the kinds of banks and illustrate the Balance sheet with suitable example CO4: Interpret fixed cost and variable cost and technical feasibility and economic feasibility CO5: Apply break even analysis and summarize the managerial uses of breakeven analysis

Basic Economics

Definition of economics – nature and scope of economics – basic concepts of economics – factors of production – demand analysis – definition of demand – Law of demand – Exception to law of demand – Factors affecting demand – elasticity of demand – demand forecasting – definition of supply – factors affecting supply – elasticity of supply – market structure – perfect competition – imperfect competition - monopoly – duopoly – oligopoly and bilateral monopoly . [9]

Organization and Business Financing

Forms of business – proprietorship – partnership - joint stock company - cooperative organization – state Enterprise - mixed economy - Money and banking – kinds of banking - commercial banks - central banking functions - control of credit - monetary policy - credit instrument – Types of financing - Short term borrowing - Long term borrowing - Internal generation of funds - External commercial borrowings - Assistance from government budgeting support and international finance corporations- analysis of financial statement- Balance sheet-profit and loss account- Funds flow statement- Examples in all members [9]

Financial Accounting and Capital Budgeting

The balance Sheet and related concepts – The profit and loss statement and related concepts – Financial ratio analysis – Cash flow analysis – fund flow analysis – Capital budgeting– Average rate of return – Payback period – Net present value and internal rate of return. [9]

Cost Analysis

Types of costing – traditional costing approach - activity based costing - Fixed Cost – variable cost – marginal cost – cost output relationship in the short run and in long run – pricing practice – full cost pricing – marginal cost pricing – going rate pricing – bid pricing – pricing for a rate of return – appraising project profitability - cost benefit analysis – feasibility reports – appraisal process – technical feasibility - economic feasibility – financial feasibility. [9]

Break Even Analysis

Basic assumptions –break even chart – managerial uses of break even analysis - applications of break even analysis in engineering projects. [9]

Total Hours : 45

Textbook(s):

1. Khan, M Y, Jain, 'Basic Financial Management ', 3rd Edition, McGraw Hill Education, 2017.
2. Maheshwari K. L., Varshney R.L., 'Managerial economics',2nd Edition, S Chand and Co., New Delhi, ,2014.

Reference(s):

1. Samuelson P.A, 'Economics - An Introductory', New Age Publications, New Delhi, 2009.
2. Barthwal R.R., 'Industrial Economics - An Introductory', New Age Publications, New Delhi, 2010.
3. S.K.Bhattacharyya , John Deardon and Y.K.Koppikar, Accounting for Management Text and Cases '.
4. V.L.Mote,Samuel and G.S.Gupta, 'Managerial Economics - Concepts and Cases', Tata McGraw Hill, 2011.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	2	1	2	3	2	3	1	2	1	3	3
2	3	2	3	1	1	2	1	1	3	2	3	2	2	2
3	2	1	2	1	2	3	3	1	1	3	2	1	2	3

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4	3	2	3	3	2	2	1	2	2	1	3	2	3	2
5	2	1	3	1	1	3	2	1	2	2	3	1	2	2

K.S.Rangasamy College of Technology – Autonomous R2018								
50 CS 701 – Data Science								
CS								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	2	75	4	50	50	100
Objective(s)	• The objective of this course is to impart necessary knowledge of the mathematical foundations needed for data science and develop programming skills required to build data science applications							
Pre-requisites	Fundamentals in linear algebra / statistics / probability							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Understand the basics of Data Sciences CO2: To know the mathematical foundations needed for data Science and perform Exploratory Data Analysis. CO3: Implement models such as k-nearest Neighbors, Naive Bayes, linear and logistic Regression, decision trees, neural networks and clustering. CO4: Create effective visualization of given data CO5: Build data science applications.							

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction to core concepts and technologies: Introduction, Terminology, Data-Properties of Data, Types of data, Why Data Science? Computer Science, Data Science, and Real Science, data science process, Data Acquisition and Data Science Life Cycle, Ethics in Data Science, data science toolkit, Example applications. Data wrangling: Sources of data, Data collection and API, Working with data: Reading Files, Cleaning Data. [8]

Statistical Inference, Exploratory Data Analysis:
Statistical thinking in Data Science, Statistical Inference, Statistical Analysis, Modeling, Exploratory Data Analysis: Philosophy of Exploratory Data Analysis, Data visualization, Missing value analysis, The correction matrix, Outlier detection analysis [9]

Basic Machine Learning Algorithms: Brief introduction, Linear / Polynomial Regression, Logistic Regression, Classification, Regularization, Support vector machines, Naive Bayes, Cross Validation, Label Encoding, Random Forests, Decision Trees, Clustering, Dimensionality reduction, Manifold learning, 2D/3D Convolution, Introduction to Neural Networks, Evaluation Metrics. [10]

Data visualization: Introduction, Types of data visualization, Data Visualization - Basic principles, ideas and tools for basic data visualization tools (plots, graphs and summary statistics)- various visualization techniques used in Data Science. Data visualization Tool: Working with Tableau, Creating charts, Mapping data in Tableau. create

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your own visualization of a complex dataset [10]

Applications of Data Science, Case Studies of Data Science Application , Recommender Systems on Real-World Data Sets, Weather forecasting, Stock market prediction, Object recognition, Matching Skills to Job. [8]

Laboratory:

1. Perform Data exploration and preprocessing
2. Implement Linear and Logistic regression
3. Implement Naive Bayes classifier for dataset stored as CSV file.
4. Implement regularized logistic regression
5. Build models using different Ensembling techniques
6. Build models using Decision trees
7. Build model using SVM with different kernels
8. Implement K-NN algorithm to classify a dataset.
9. Build model to perform Clustering using K-means after applying PCA and determining the value of K using Elbow method.
10. Simulate Singular Value Decomposition

Mini project to predict the time taken to solve a problem given the current status of the user.

Total Hours : 45+30=75 hours

Text book(s):

1	Cathy O'Neil, Rachel Schutt, Doing Data Science, Straight Talk from The Frontline. O'Reilly, 2013
2	Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media

Reference(s):

1	Jure Leskovek, Anand Rajaraman, Jeffrey Ullman, Mining of Massive Datasets. v2.1, Cambridge University Press, 2014.
2	Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media
3	Jeeva Jose, "Machine Learning", Khanna Publishing House, Delhi.
4	Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Morgan Kaufmann Publishers
5	Jain V.K., "Data Sciences", Khanna Publishing House, Delhi.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3			2							1	2	3
2	3	3	3	2	3				2		2	2	2	3
3	3	3	3	3	3	3			2		2	2	2	3
4	3	3	3	2	3				2			2	2	3
5	2	3	3	3	3	3	3		2		2	2	2	3

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50 CS 702 - Mobile computing								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100

Objective(s)	• To learn the basics of Wireless voice and data communications technologies. • To build working knowledge on various telephone and satellite networks. • To study the working principles of wireless LAN and its standards. • To build knowledge on various Mobile Computing Algorithms. • To build skills in working with Wireless Application Protocols to develop mobile content applications.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Acquire the knowledge in fundamentals of wireless communication CO2: Recognize the concept of digital cellular network and unidirectional broadcast systems CO3: Observe various WLAN products , its system and protocol architecture CO4: Identify the requirements of Mobile IP for Ipv4 and Ipv6 and various types of routing protocols CO5: Acquire the knowledge of TCP for mobility and WAP

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Wireless Communication Fundamentals

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks [10]

Telecommunication Networks

Telecommunication systems – GSM – GPRS –Satellite Systems - Broadcast Systems – DAB - DVB. [9]

Wireless Lan

Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a - 802.11b standards – Hiperlan – Blue Tooth. [9]

Mobile Network Layer

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR –Least Interference Routing-Hierarchical-Geographic Position Assisted Ad Hoc Routing . [9]

Transport and Application Layers

Traditional TCP – Classical TCP improvements – WAP [8]

Total Hours: 45 hours

Text book:

1.	Jochen Schiller, “Mobile Communications”, PHI/Pearson Education, Second Edition, 2008.
2.	William Stallings, “Wireless Communications and Networks”, PHI/Pearson Education, 2002.

Reference(s) :

1.	Kaveh Pahlavan, Prasanth Krishnamoorthy, “Principles of Wireless Networks”, PHI/Pearson Education, 2003.
2	Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, New York, 2003.
3	Hazysztof Wesolowshi, “Mobile Communication Systems”, John Wiley and Sons Ltd, 2002.
4	Raj kamal,” Mobile computing” OXFORD university press, 3rd edition, 2018

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

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1	3	3	2	2				3		2			2	
2	3	2	3	2						2		2	2	
3	3	2	3	2	2					2			2	
4	3	3	3	2						2			2	2
5	3	3	2	2	2					2		2	2	

K. S. Rangasamy College of Technology – Autonomous R2018								
50 CS 703 Cloud Computing								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100

Objective(s)	1. To provide students with the fundamentals and essentials of Cloud Computing 2. To provide students a sound foundation of the Cloud Computing so that they can start using and adopting Cloud Computing services and tools in their real-life scenarios 3. To enable students exploring some important cloud computing driven commercial systems and applications 4. An understanding of when and where to use it using the appropriate industry models 5. To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research
Course outcomes	**At the end of the course, the students will be able to** CO1:Know the Characteristics of Cloud computing CO2:To illustrate the Cloud service models and Cloud Deployment Models CO3:Develop an application using Paas Application frameworks CO4:Reveal the major security and privacy problems in the Cloud with security mechanism CO5:To use Open Source & Commercial Clouds

Introduction

Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Benefits of Cloud Computing, Cloud computing - Cluster computing, Grid computing, Assessing the role of Open Standards, Measuring the cloud's value, Cloud Architecture - Exploring the cloud computing stack

Cloud Computing Architecture & Infrastructure as a Service

Cloud computing stack, Service Models (XaaS) - Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Deployment Models - Public, Private, Hybrid and Community Cloud, Infrastructure as a Service (IaaS), Resource Virtualization - Server, Storage, Network

Platform as a Service & Software as a Service

Introduction to PaaS, Cloud Platform and Management - Computation, Storage, Software as a Service (PaaS) - Introduction, Web Services, Web 2.0, Web OS, Service Management in Cloud Computing - Service Level Agreements (SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Managing Data in Cloud

Cloud Security

Infrastructure Security, Data security and Storage - Data privacy and security Issues, Jurisdictional issues, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations

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Cloud Storage and Case Studies Cloud Storage - Cloud Array, Shared Cloud Storage, Cloud Storage Gateway-Sync, Case Studies - Creating private IaaS in Eucalyptus, Creating virtual server in Microsoft Azure, Creating virtual sever in Amazon EC2, Hosting application in Google Google Cloud.	
Text book	
1	Barrie Sosinsky, “Cloud Computing Bible”, Wiley, 2011.
2	Thomas Erl, Zaigham Mahmood, Ricardo Puttini, “Cloud Computing: Concepts, Technology & Architecture”, Pearson, 2014
Reference(s):	
1	Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, “Cloud Computing: Principles and Paradigms”, Wiley, 2011
2	Nikos Antonopoulos, Lee Gillam, “Cloud Computing: Principles, Systems and Applications”, Springer, 2012
3	Ronald L. Krutz, Russell Dean Vines, “Cloud Security: A Comprehensive Guide to Secure Cloud Computing”, Wiley, 2010
4	Haley Beard, “Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloudwith SLAs”, Emereo Pty Limited, 2008.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2						2				
2	3	2	3	2						2		2		
3	3	2	3	2	2				3	2			3	
4	3	3	3	2						2			3	
5	3	3	2	2	2				3	2		2	3	

K.S.Rangasamy College of Technology – Autonomous R2018							
50 AC 001 Research Skill Development - I							
Semester	Hours / Week			Total Hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
VII	1	0	0	10	0	100	-	100
Objective(s)	• To learn about the effective usage of power point presentation • To prepare presentation with various effects • To visualize the data in the presentation • To acquire knowledge about data sources • To investigate the research articles based on various applications						
Course Outcomes	**At the end of the course, the students will be able to** CO1: Develop presentation with visual effects CO2: Prepare a presentation with supporting data CO3: Attain the importance of research and data collection CO4: Analyze the various sources of research articles						

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	CO5: Interpret the tools and methods in preparing manuscript

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

Preparing a Presentation (3)

Presenting data using Power Point- Power Point preparation and presentation, Design principles for creating effective Power Point slides with visuals displaying data. - Profile, - Problem, and a set of basic Excel charts, use to create a presentation.

Creating effective slides using PowerPoint (2)

Create effective slides using PowerPoint. Tools within Power Point, structure story line, create story boards, identify primary elements of slide design, display data and finalize slide presentation.

Research Designs and Data Sources (3)

Overview of the topics: process of data collection and analysis. Starting with a research question - Review of existing data sources- Survey data collection techniques- Importance of data collection- Basic features affect data analysis when dealing with sample data. Issues of data access and resources for access.

Measurements and Analysis Plan (2)

Importance of well-specified research question and analysis plan: various data collection strategies - Variety of available modes for data collection – review of literature - Tools at hand for simple analysis and interpretation.

Total Hours: 10

Text Book(s):

1.	Judy Jones Tisdale. Effective Business Presentations. Gulf Coast Books LLC. ISBN-13: 978-0130977359, 2004.
2.	Frauke Kreuter. Framework for Data Collection and Analysis,2018. https://www.coursera.org/learn/data-collection-framework

Reference(s)

1.	Kothari, C.R. andGaurav Garg, “Research Methodology: Methods and Techniques”, New Age International Publishers, 2013
2.	Srivastava, T.N. and Rego, S., "Business Research Methodology", Tata McGrawHill Education Pvt. Ltd., Delhi, 2019.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3		3	2				2	3	3			3
2	3	3	1	2	2		2		2	3	2	1		3
3	3	3	2	2			2		1	3		1	3	3
4	3	3	3	2		2	1	2		3	2	2	3	2
5	3	3	2	2		2	1		2	3	2	2	3	2

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K.S.Rangasamy College of Technology - Autonomous								
50 CS 7P1 Cloud Computing Laboratory								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	0	0	4	60	2	60	40	100
Objective(s)	• Be exposed to tool kits for grid and cloud environment. • Be familiar with developing web services/Applications in grid framework • Learn to run virtual machines of different configuration. • Capability to develop cloud architecture and model • Learn to configure and use Hadoop							
Course Outcomes	CO1: Ability to use the relevant tools necessary for cloud computing. CO2: Demonstrate the use of cloud computing in various applications. CO3: Apply different cloud programming model as per need. CO4: Ability to develop cloud architecture and model. CO5: Analyze and implement the best practice model to deploy cloud architecture and configure Hadoop file system and framework in multi node cluster							
	1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular timein host machine. (Virtual Box or VM Ware or Hyper-V) 2. Install a C compiler in the virtual machine and execute a sample program. 3. Develop a web application to provide Storage as a Service hat offers a simple interface which allows users to manage file systems quickly and easily. 4. Configure IaaS architecture for installing guest operating system using Eucalyptus. 5. Configure IaaS architecture in Eucalyptus for installing multiple operating systems in same host machine by sharing different core in the same processor. To set up the single and multi node Hadoop cluster in guest operating systems. Demonstrate the use of Map and Reduce tasks using word count program.							

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2		3					2			3	
2	3	2	3		3	2				2		2	3	
3	3	2	3		3	2		2	3	2			3	
4	3	3	3		3	2		2		2	3		3	
5	3	3	2		3		2	2	3	2	3	2	3	3

K.S.Rangasamy College of Technology – Autonomous R2018
50 CS 7P2 Project Work Phase-I

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Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	0	0	4	60	2	100	00	100
Objective(s)	Imparting the practical knowledge to the students and also to make them to carry out the technical procedures in their project work. To provide an exposure to the students to refer, read and review the research articles, journals and conference proceedings relevant to their project work and placing this as their beginning stage for their final presentation.							
Course outcomes	CO1: Identify a problem in the domain of interest CO2: Perform literature survey and identify the existing issues CO3: Identify the possible solutions CO4: Identify tools and techniques to implement the project CO5: Prepare technical report							

1. Three reviews have to be conducted by the committee of minimum of three members one of which should be the guide
2. Problem should be selected
3. Students have to collect about 20 papers related to their work
4. Reports has to be prepared by the students as per the format in Annexure – 1
5. Preliminary implementation can be done if possible
6. Internal evaluation has to be done for 100 Marks`

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	3	3	3	3	3	3	3	3	3	3	3	3	3	3
5	3	3	3	3	3	3	3	3	3	3	3	3	3	3

K.S. Rangasamy College of Technology - Autonomous R 2018							
50 TP 0P5 Career Competency Development V							
Common to All Branches							
Semester	Hours/Week			Credit	Maximum Marks		
	L	T	P	C	CA	ES	Total
VII	0	0	2	0	100	00	100

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Course Objectives	• To help the learners to practice the written and oral communication skills in the academic and professional contexts • To help the learners to practice the verbal and logical reasoning ability to meet out the requirements of both competitive exams and companies • To help the learners to practice effectively the aptitude modules for company based recruitments and competitive exams • To help the learners to practice effectively the data interpretation and analysis modules for company based recruitments and competitive exams • To help the learners to hone the technical and programming skills for better employability
Course Outcomes	**At the end of the course, the student will be able to** CO1: Reinforce the written and oral communication skills in the academic and professional contexts CO2: Discriminate and assess the verbal and logical reasoning ability to meet out the employability requirements of the companies CO3: Relate the aptitude modules for company based recruitments and competitive exams effectively CO4: Compare and illustrate the data interpretation and analysis modules effectively for company based recruitments and competitive exams CO5: Formulate and integrate the technical and programming skills to be focused on better employability and code contests.

Unit – 1	Written and Oral Communication	Hrs
Self Introduction – GD – HR Interview Skills – Corporate Profile Review Practices on Company Based Questions and Competitive Exams Materials: Instructor Manual		6
Unit – 2	Verbal & Logical Reasoning	6
Practices on Company Based Questions and Competitive Exams Materials: Instructor Manual		
Unit – 3	Quantitative Aptitude	6
Practices on Company Based Questions and Competitive Exams Materials: Instructor Manual		
Unit – 4	Data Interpretation and Analysis	6
Practices on Company Based Questions and Competitive Exams Materials: Instructor Manual		
Unit – 5	Programming & Technical Skills – Part 3	6
Data Structure - Arrays – Linked List – Stack – Queues – Tree – Graph Practices on Algorithms and Objective Type Questions Materials: Instructor Manual		
	Total	30

Evaluation Criteria

S.No.	Particular	Test Portion	Marks
1	Evaluation 1 Written Test	15 Questions each from Unit 1, 2,3, 4 & 5 (External Evaluation)	60
2	Evaluation 2 - Oral Communication	GD and HR Interview (External Evaluation by English, MBA Dept.)	20
3	Evaluation 3 – Technical Interview	Internal Evaluation by the Dept. – 3 Core Subjects	20
		Total	100

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Reference Books

1. Aggarwal, R.S. “A Modern Approach to Verbal and Non-verbal Reasoning”, Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2. Abhijit Guha, “Quantitative Aptitude”, TMH, 3rd edition
3. Objective Instant Arithmetic by M.B. Lal & GoswamiUpkar Publications.
4. Word Power Made Easy by Norman Lewis W.R. GOYAL Publications Note:

- Instructor can cover the syllabus by Class room activities and Assignments(5 Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough work pages
- Each Assignment has 20 questions for Unit 1,2,3,4 & 5 and Unit 5 and 5 questions from Unit 5(Algorithms) & Unit 1(Oral Communication)
- Evaluation has to be conducted as like Lab Examination.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1									3	3	2	3	1	2
2									3	3	3	3	2	2
3	3	2	2	2			1		3	3		3		2
4	3	3	2	3	2	1			3	2	3	3	3	3
5	3	2	2	2	3	2		2	3	2		3	3	3

K.S.Rangasamy College of Technology – Autonomous R 2018								
50 MY 003 - Ethics for Engineers								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	2	0	0	30	-	100	-	100
Objective(s)	• To enable the students to create an awareness on Engineering and Human Values • To instill Moral and Social Values and Loyalty • To inculcate the habits of appreciate the right of others • To impart knowledge on safety and risk • To know the global issues and its importance							
Course Outcomes	**At the end of the course, the student will be able to** CO1 Apply ethics in society, CO2 Discuss the ethical issues related to engineering CO3 Apply ethics in Work Place CO4 Realize the responsibilities and right in the society. CO5 Explain the global issues and responsibilities of leaders to address the same							
Note: The hours given against each topic are of indicative. The faculty have the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.								

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Human Values

Moral values and Ethics - Integrity-Work ethic-Service learning-Civic virtue-Respect for others – Living Peacefully – Caring – Sharing – Honesty – Courage-Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality-Introduction to yoga and meditation for professional excellence and Stress management.

[6]

Engineering Ethics

Senses of 'Engineering Ethics'-Variety of moral issues-Types of inquiry-Moral dilemmas – Moral Autonomy – Kohiberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self – interest – Customs and Religion – Uses of Ethical Theories. [6] **Engineering as social experimentation**

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics A Balanced Outlook on Law. [6]

Safety, Responsibilities and rights

Safety and Risk – Assessment of Safety and Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Right – Employee Right – Intellectual Property Rights (IPR) – Discrimination. [6]

Global Issues

Multinational Corporations – environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineering – Engineers as Expert Witnesses and Advisors – Moral Leadership – Code of Conduct – Corporate Social Responsibility.

[6]

Total Hours: 30

Text Book(s):

1.	Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi 2003
2.	Gail Baura, 'Engineering Ethics 1st Edition An Industrial Perspective' Imprint: Academic Press Published Date: 11th April 2006

Reference(s)

1.	Charies B. Fleddermann, 'Engineering Ethics', Pearson Prentice Hall New Jersey, 2004.
2.	Charies E. Harris, Michael S. Pritchard and Michael J. Rabins, 'Engineering Ethics – Concepts and Cases', Cengage Learning, 2009
3.	John R Boatright, 'Ethics and the Conduct of Business', Pearson Education, New Delhi, 2003
4.	Steve Starrett, "Engineering Ethics: Real World Case Studies", ASCE Book Series, 2014

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	2	1	2	3	2	3	1	2	1		
2	3	2	3	1	1	2	1	1	3	2	3	2		
3	2	1	2	1	2	3	3	1	1	3	2	1		
4	3	2	3	3	2	2	1	2	2	1	3	2		
5	2	1	3	1	1	3	2	1	2	2	3	1		

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50 AC 002 Research Skill Development - II

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	1	0	0	15	0	100	0	100

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Objective(s)	• To identify the ethics in preparing research paper • To organize manuscript for submission • To attain knowledge for filing Patent • To apply for copy right • To develop and deploy Mobile App. in play store
Course Outcomes	**At the end of the course, the students will be able to** CO1: Prepare a manuscript for journal publication. CO2: Apply the manuscript for publication CO3: Interpret the process of obtaining copyright and patent CO4:Analyze the various provisions to share the application CO5:Create and publish the mobile application in the digital store

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Preparation of Manuscript (3)

Data necessary before writing a paper: the context in which the scientist is publishing. Learning and identification of research community - advantages of scientific journal publication and manuscript preparation - ethical values in publishing.

Writing the paper (2)

Writing research paper - structure of the paper - usage of bibliographical tools - abstract preparation and to do a peer review for the abstract of the others, as in real academic life. Plagiarism of the prepared manuscript.

Copyright (2)

Copyright law in India-Meaning of copyright-Classes of works for copyright protection -Ownership of Copyright-Assignment of copyright-Intellectual Property Rights (IPR) of Computer Software-Copyright Infringements-Procedure for registration

Patents (3)

Patent System In India -Types of Patent Applications-patentable invention - Not patentable-Appropriate office for filing -Documents required Publication and Examination of Patent Applications -Grant of Patent-Infringement of Patents -E-filing of Patent applications

Deploying Mobile App. in play store (5)

Introduction to Application Stores – Play Store, App Store, Microsoft Store, Creating App – Android, iOS, UWP, Defining Manifest, Certifying App, Create Store Listing, Sharing Screenshots, Sharing App Credentials for Testing.

Total Hours: 15

Text Book(s):

1.	Mathis Plapp. How to Write and Publish a Scientific Paper (Project-Centered Course). https://www.coursera.org /learn/how-to-write-a-scientific-paper#instructors
2.	Rajkumar S. Adukia ,Handbook On Intellectual Property Rights In India,2007
3	Dr. M. Kantha Babu ,"Text book on Intellectual Property Rights",2019.

Reference(s)

1.	Kothari, C.R. andGaurav Garg, "Research Methodology: Methods and Techniques", New Age International Publishers, 2013
2.	Srivastava, T.N. and Rego, S., "Business Research Methodology", Tata McGrawHill Education Pvt. Ltd., Delhi, 2019.
3.	https://support.google.com/googleplay/android-developer/answer/9859152
4.	https://developer.apple.com/ios/submit/
5.	https://docs.microsoft.com/en-us/windows/uwp/publish/app-submissions

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CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3				3	-	2	3	1		3
2	3	3	3	3			1	2	2	2	2	1		3
3	3	3	2	2	2		2	2	1	2	1	1	3	3
4	3	3	3		3	2	2		2		2	2	3	2
5	3	3	3		3	2	2		2		2	2	3	2

K.S.Rangasamy College of Technology - Autonomous								
50 CS 8P1 Project Work Phase-II								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	0	0	16	240	08	50	50	100
Objective(s)	Enabling and strengthening the students to carry out the project on their own and to implement their innovative ideas to forefront the risk issues and to retrieve the hazards by adopting suitable assessment methodologies and stating it to global.							
Course outcomes	CO1: Design modules of the project CO2: Integrate the modules and arrive the final output CO3: Investigate the results with available solutions CO4: Demonstrate the outcome of the project and verify. CO5: Prepare technical report							

1. Three reviews have to be conducted by the committee of minimum of three members one of which should be the guide
2. Each review has to be evaluated for 100 Marks
3. Attendance is compulsory for all reviews. If a student fails to attend review for some valid reason, one or more chance may be given
4. They should publish the paper preferably in the journals / conference
5. Final review will be done by the committee that consists of minimum of three members one of which should be the guide (If possible include one external expert examiner with in the college)
6. The Report should be submitted by the students around at the end of April.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	3	3	3	3	3	3	3	3	3	3	3	3	3	3
5	3	3	3	3	3	3	3	3	3	3	3	3	3	3

K. S. Rangasamy College of Technology – Autonomous R2018				
51 CS L01 –Object Oriented Programming				
Open Elective				
Semester	Hours / Week	Total hrs	Credit	Maximum Marks

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	L	T	P		C	CA	ES	Total
	2	0	2	45	3	50	50	100

Objective(s)	• To enable the students to learn how C++ supports object Oriented properties • To create and use classes, objects, constructors and destructors for specific applications • To learn how inheritance and virtual functions implement dynamic binding with polymorphism. • To learn how to design and implement generic classes with C++ templates. • To learn how to use exception handling in C++ programs.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Recognize the principles of object-oriented problem solving and programming CO2: Implement the concept of classes and objects CO3: Analyze the concept of reusability and compile time polymorphism CO4: Recognize the concept of dynamic memory allocation and runtime polymorphism CO5: Identify the uses of generic programming and exception handling

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction to C++ and Functions:

Evolution of C++ - Concepts of OOP - Advantages of OOP, Basics of C++: Structure of a C**++** Program **-** Streams in C++ and Stream Classes - Unformatted Console I/O Operations, C++ Declarations, Functions: Return by Reference -Default Arguments - Const arguments - Inline Functions - Function Overloading. [9]

Classes and Objects, Constructors and Destructors:

Classes in C++ - Declaring Objects- Access Specifiers and their Scope - Defining Member Functions - Static Members - Array of Objects - Object as Function Arguments - Friend Function and Friend Classes, Constructors and Destructors: Characteristics - Parameterized Constructor - Overloading Constructor - Copy Constructor - Dynamic Initialization Constructor – Destructors. [9]

Inheritance, Compile Time Polymorphism and Type Conversion:

Inheritance: Reusability - Types of Inheritance - Abstract Classes - Object as Class Member, Operator Overloading: Rules for Operator Overloading – The Keyword Operator –Unary and Binary Operators Overloading-Overloading using Friend Function - Type Conversion. [10]

Pointers, Memory Models, Binding and Polymorphism:

Pointers: Pointer to Class - Pointer to Object – void, wild and this Pointers – Pointer to Constant and Constant Pointers, Memory Models: Dynamic Memory Allocation - Heap Consumption - Dynamic Objects, Polymorphism: Binding in C++ - Pointer to Base and Derived class objects - Working with Virtual Functions - Pure Virtual Functions - Object Slicing - Virtual Destructor. [9]

Generic Programming with Templates, Exception Handling:

Class Templates - Function Templates - Exception Handling: Principles of Exception Handling - try, throw and catch keywords - Re-throwing Exception - Specifying Exception. [8]

Total Hours : 45

Text book(s):

1. Ashok N. Kamthane, “Programming in C++”, Pearson, Second Edition, 2016.
2. Herbert Schildt, “ The Complete Reference C++”, Fourth Edition, McGraw-Hill Education, 2013.

Reference(s) :

1. Bjarne Stroustrup, “The C++ programming language”, Addison Wesley, 2013.
2. Venugopal K.R., Rajkumar Buyya, ”Mastering C++”, Second Edition,McGraw-Hill Education, 2013.
3. Rajesh K. Shukla, ”Object-Oriented Programming in C++”, Wiley-India Edition, 2008
4. E Balagurusamy, ”Object Oriented Programming with C++”, Sixth Edition, McGraw-Hill Education, 2013.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

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1	3	3	3		2				2		2		3	
2	3	3	3		2				2		2		3	
3	2	2	3		2				2		2		3	
4	2	2	3		2								3	
5	3	2	3		2				2		2		3	

K.S. Rangasamy College of Technology – Autonomous R2018								
51 CS L02 Angular JS								
Open elective								
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
	2	**0**	**2**	**45**	**3**	**50**	**50**	**100**

Objective(s)	• To understand the design of single-page applications and how Angular JS facilitates their development • To properly separate the model, view, and controller layers of your application and implement them using Angular JS • To master Angular JS expressions, filters, and scopes • To build Angular forms • To elegantly implement Ajax in your Angular JS applications
Course Outcomes	**At the end of the course, the students will be able to** CO1: Recall the concepts of HTML and JavaScript and express the features of AngularJS CO2: Rephrase the purpose of binding and template and the various effects of elements and events CO3: Gain the knowledge of scopes and controllers and various features of directives CO4: Identify the several services and its works and Design the applications using AJAX CO5: Comprehend the concepts of animation services and the various actions of provision and injection services

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

Introduction

Introduction to AngularJS: HTML and Bootstrap CSS Primer - JavaScript Primer - Single Page Application – MVC Architecture – first Application of AngularJS. [9]

Working with AngularJS

Binding – Template Directives – Elements – Events [9]

Working with Forms

Forms – Controllers – Scopes – Filters - Custom & Complex Directives [9]

Working with Services

Modules – Services – Global objects – Errors and Expressions – AJAX and Promises [9]

Advanced Services

REST – Views – Animation – Touch – Provision – Injection [9]

Total Hours : 45

Text book:

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1	Adam Freeman, “Pro AngularJS”, Apress Publications.
2	Ken Williamson,” Learning AngularJS: A Guide to AngularJS Development”, O' Reilly,2015
Reference(s) :	
1	Brad Green, ShyamSeshadri, “AngularJS”, O’REILLY publications.
2	AgusKurniawan**, “**AngularJS Programming**”, Kindle Edition.**
3	ValeriKarpov, Diego Netto, “Professional AngularJS”, Kindle Edition.
4	Doguhan Uluca,” Angular 6 for Enterprise-Ready Web Applications: Deliver production-ready and cloud-scale Angular web apps”,kindle Edition,2018

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	2	2	3			2	3	2		3	2	
2		3	2	2	3			2	3	2		3	2	
3		3	2	2	3			2	3	2		3	2	
4		2	2	2	3			2	3	2		3	2	
5	2	2	2	2	3			2	3	2		3	2	

K. S. Rangasamy College of Technology – Autonomous R2018

51 CS L03 / 51 CS E12 C# and .NET Core

Open Elective

Semester	Hours / Week			Total hrs.	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	2	0	2	45	3	50	50	100

Objective(s)

- To gain the fundamental skills in C# programming Language
- To gain knowledge in object-oriented concepts in C#
- To understand the concepts of the .NET Core and its platform
- To implement data manipulation using Razor pages
- To enhance the knowledge in Model-View-Controller architecture

Course Outcomes

At the end of the course, the students will be able to

CO1: Know the basic concepts of C#
CO2: Understand the Object-Oriented concepts in C#
CO3: Ability to develop web pages using ASP.NET Core platform
CO4: Implement the data manipulation concept using Razor Pages
CO5: Integrate the concept of MVC in ASP.NET Core platform

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction to C#:

Introducing C# – Understanding .NET – Overview of C# – Literals – Variables – Data Types – Operators – Expressions – Branching – Looping – Methods – Arrays – Strings – Structures – Enumerations. [8]

Object-Oriented Programming in C#:

Classes – Objects – Inheritance – Methods – Polymorphism – Interfaces – Operator Overloading – Delegates – Events – Errors – Exceptions – Collections – Managing Filesystem. [8]

ASP.NET Core Web Application using Razor Pages:

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Introduction to ASP.NET Core Web Application – Environment Setup – Project Layout – Static and Default Files

- Enabling and Defining Razor Pages – Shared Layouts – Using code-behind files. [10]

Data Manipulation using Razor Pages:
Introduction to ADO.NET – Connection Class with Authentication – Command Class – DataReader Class – DataAdapter Class – DataSet – OnGet –OnPost – OnPostDelete – OnPostEdit – OnPostView – REST API – Model and Controller for REST API. [10]

Model-View-Controller (MVC) in ASP.NET Core:
Introduction to MVC – Setting up an ASP.NET Core MVC Website – MVC Routing – Controllers and Actions – Model – Views – Parameters Passing – View Helpers – Model Validation. [9]

Total Hours: 45 hours

Text book(s):

1.	Mark J. Price, "C# 8.0 and .NET Core 3.0 – Modern Cross-Platform Development", 4th Edition, Packt Publishing Limited, 2019.
2.	Dino Esposito, "Programming ASP.NET Core", 1st Edition, Pearson Education Inc., 2018

Reference(s):

1.	https://docs.microsoft.com/en-us/aspnet/core/
2.	Christian Nagel, "Professional C# 7 and .NET Core 2.0", 1st Edition, Wiley Publication, 2018
3	Andrew Troelsen Phil Japikse," Pro C# 8 with .NET Core 3: Foundational Principles and Practices in Programming", Apress, 2020
4	Jon Skeet," C# in Depth",Fourth Edition, 2019

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	3		3				3	3	2	2	3	
2	3	3	3		3				3	3	2	2	3	
3	2	3	3		3				3	3	2	2	3	
4	2	3	3		3				3	3	2	2	3	
5	3	3	3		3				3	3	2	2	3	

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51 CS L04 Network Setup and Administration

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Open Elective								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	2	0	2	45	3	50	50	100

Objective(s)	• To understand the functions of various networking devices • To study the switching, addressing and routing technologies • To understand the function and types of firewall • To learn to set up VPN and build own firewall
Course Outcomes	**At the end of the course, the students will be able to** CO1: Recognize the purpose and functions of various network devices CO2: Configure and verify initial switch configuration and switch IOS CO3: Understand the IP addressing and create a subnet CO4: Acquire the knowledge of basic routing concepts and verify operation status of a router CO5: Working with proxies and application - level firewalls and setting up a virtual private network

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction

Introduction to packet tracer: key features, benefits. Recognize the purpose and functions of various network devices such as routers, switches, bridges and hubs. Identify common applications and their impact on the network. Identify the appropriate media, cables, ports, and connectors to connect network devices to other network devices and hosts in a LAN. [9]

LAN Switching Technologies

Packet tracer: create the topology, configure and verify initial switch configuration including remote access management. Configure switch IOS basics – hostnames, console, privilege password and telnet password. [9]

IP Addressing

IPv4 address - necessity of using private and public IP addresses for IPv4 addressing, IPv4 addressing scheme using VLSM and summarization to satisfy addressing requirements in a LAN environment. Subnet mask and DNS lookup. [9]

IP Routing Technologies

Basic routing concepts - boot process of IOS routers - configure and verify utilizing the CLI to set basic router configuration - configure and verify operation status of a device interface, both serial and Ethernet - verify router configuration and network connectivity. [9]

Firewall and Network Security

Firewall configuration strategies-packet filtering-firewall configuration and administration - working with proxies and application - level firewalls-authenticating users- setting up a virtual private network- building your own firewall [9]

Total Hours : 45

Text book(s):

1	CCNA Routing and Switching Study Guide Paperback – 15 Oct 2013 by Todd Lammle
2	Networking All-in-One For Dummies® Paperback – Import, 22 Oct 2010 by Doug Lowe

Reference(s):

1	Cisco ASA ConfigurationRichard A. Deal(McGraw Hill, 2009)ISBN: 978-0-07-162269-1
2.	Guide to Firewalls and Network Security by Greg Holden (Course Technology, 2004)

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

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1	3	3	2		2					1		3	2	
2	3	3	3	2	2					2		1	2	
3	3	3	2	3	2					3		3	2	
4	3	2	2	3	2					3		3	2	2
5	3	2	2	2	2					3		3	2	2

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51 CS L05 Data Mining

Open Elective

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	2	0	2	45	3	50	50	100

Objective(s)	• To introduce basic concepts, tasks, methods, and techniques in data mining. • To emphasis is on various data mining problems and their solutions. • To understand the data mining process and issues, learn various data mining techniques • To apply the techniques in solving data mining problems using data mining tools and systems • To apply the clustering analysis and statistical approach
Course Outcomes	**At the end of the course student will able to** CO1: Elucidate the basic concept and issues of Data Mining CO2: Explore about multidimensional model and cube operations CO3: Narrate the steps of data preprocessing and multidimensional association rules CO4: Discuss different classification techniques and association rule mining and its applications CO5: Outline different clustering techniques, outlier analysis and its applications

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction to Data Mining

Motivation and importance - 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 Warehouse and Olap Technology for Data Mining

What is a Data Warehouse - Multi-Dimensional Data Model - Data Warehouse Architecture – Data Warehouse Implementation - Development of Data Cube Technology - Data Warehousing to Data Mining. [9] **Data Preprocessing**

Why Pre-process the Data? - Data Cleaning - Data Integration and Transformation Data Reduction - Discretization and Concept Hierarchy Generation - Data Mining Primitives: Mining Association rule in large Databases - Association Rule Mining - Mining Single-dimensional Boolean Association rules from Transactional Databases - Mining Multi-dimensional Association rules from relational databases & Data Warehouses. [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]

Cluster Analysis

What is Cluster Analysis? - Types of Data in Cluster Analysis - A Categorization of Major clustering methods - partitioning methods - Hierarchial methods - Density-Based Methods: DBSCAN - Grid-based Method: STING - Model-based Clustering Method: Statistical approach - Outlier analysis [9]

Total Hours : 45

Text book(s):

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, 3rd Edition, 2011 Morgan Kaufman Publications.
2. Pang-Ning Tan et.,” Introduction to Data Mining”, first edition,2006

Reference(s):

1. Adriaan, “Introduction to Data Mining”, Addison Wesley Publication
2. A.K.Pujari, “Data Mining Techniques”, University Press
3. Mohammed J. Zaki and Wagner Meira, Jr,” Data Mining and Machine Learning: Fundamental Concepts and Algorithms”, Cambridge University Press, March 2020

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

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4.	Gordon S. Linoff, Michael J. A. Berry," Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management",wiley publisher,third edition,2008

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3										2	2	2
2	2	3	3		2	2			2			2	2	2
3	2	3	3		2				2			2	2	2
4	3	3	3		2	2			3			2	2	2
5	3	3	3		2	2			3			2	2	2

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

BoS Chairman

K.S.Rangasamy College of Technology – AutonomousR2018

51 CS E13\51 CS L06 R Programming

Open Elective

Semester	Hours / Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	2	0	2	45	3	50	50	100

Objective(s)

- To introduce basic concepts in R programming
- To emphasis is on various data structures in R
- To understand the R programming fundamentals
- To work with data in R programming
- To work with strings and Dates

Course Outcomes

At the end of the course student will able to

CO1: Elucidate the history and overview of R Programming

CO2: Explore data structures in R Programming

CO3: Implement the R program using loops and functions

CO4: Manipulate the information using file

CO5: Implement string operations and dates in R

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

History and Overview of R

What is R? - What is S? - The S Philosophy - Back to R - Basic Features of R - Free Software - Design of the R System - Limitations of R - R Resources . [9]

R – Basics and Data structures in R

Math, Variables, and Strings - Vectors and Factors - Vector operations - Arrays & Matrices – Lists – Dataframes – Missing Values – Names [9]

R Programming Fundamentals

Conditions and loops - Functions in R - Objects and Classes – Debugging [9]

Working with Data in R

Reading CSV and Excel Files - Reading text files -Writing and saving data objects to file in R [9] **Strings and Dates in R**

String operations in R - Regular Expressions - Dates in R -Times in R- Operations on Dates and Times [9]

Total Hours : 45

Text book(s):

1. Roger D.Peng, “R programming for Data Science”, 1st Edition, 2015 Lean Publications.
2. **Hardley Wickham,Garrett Grolemund “**R for data science : Import, Tidy, Transform, Visualize, And Model Data”, Orielly Publications, 2017

Reference(s) :

1. https://cognitiveclass.ai/courses/r-101/
2. https://www.tutorialspoint.com/r/index.htm
3. **Nina Zumel, John Mount**, “Practical Data Science With R”, Manning Publisher, 2014.
4. https://www.datamentor.io/r-programming/

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CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1		2												3
2	2	3	3		2							2	2	3
3	2	3	3		2							2	2	3
4	2	3	3		2							2	2	3
5	2	3	3		2							2	2	3

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BoS Chairman

K.S.Rangasamy College of Technology – AutonomousR2018

51 CS E31\51 CS L07Artificial Intelligence

Open Elective

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	2	0	2	45	3	50	50	100

Objective(s)

- Understand the fundamentals of problem solving.
- Interpret the knowledge and reasoning in propositional logic and first order logic.
- Gain knowledge on Planning and acting in the real world.
- Learn to represent uncertain knowledge in solving AI problems
- Understand the different forms of learning.

Course Outcomes

At the end of the course, the students will be able to

CO1: Understand the concepts of intelligent agents and problem solving aspects.
CO2: Interpret the knowledge of propositional logic and FOL.
CO3: Understand the issues of planning problems.
CO4: Describe the Uncertainty and probabilistic reasoning.
CO5: Summarize the types of learning methods and AI applications.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Problem Solving

Introduction - What is Artificial Intelligence? – Structure of Intelligent Agents –Problem formulation – Uninformed search strategies – Informed search strategies – Constraint satisfaction problems [9] **Knowledge and Reasoning**

Logical agents – Propositional logic – First-order logic – Inference in first order logic – Unification - Forward Chaining – Backward Chaining – Resolution [9]

Planning

Planning Problem - Planning with state-space search – Partial-order planning – Planning graphs - Planning and acting in the real world - Conditional planning - Multi agent planning. [9] **Uncertain Knowledge and Reasoning**

Uncertainty – Notations and Axioms of Probability - Probabilistic Reasoning – Bayesian networks (Semantics, Exact Inference, Approximate Inference) – Inference in Temporal models – Hidden Markov models [9] **Learning and Applications**

Learning from observation -Inductive learning –Decision trees – Ensemble Learning - Explanation based learning – Statistical Learning methods. Applications of Artificial intelligence. [9]

Total Hours : 45

Text book(s):

1	S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, Third Edition, Pearson Education, 2009.
2.	Melanie Mitchell,” Artificial Intelligence: A Guide for Thinking Humans”, Farrar, Straus and Giroux Publisher,2019

Reference(s):

1	Dan W. Patterson, “Introduction to AI and ES”, Third Edition, Pearson Education, 2007.
2	Nils J. Nilsson, “The Quest for Artificial Intelligence”, Cambridge University Press, 2009.
3	Nptel course, Artificial Intelligence, https://nptel.ac.in/courses/106106126/
4	Stuart Russell,” Human Compatible – Artificial Intelligence and the Problem of Control”,Viking publisher,2019

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BoS Chairman

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2	2							2		
2	3	3	2	2	2							2		3
3	3	2	2	2	2	2						2		3
4	3	2	2	2	2	2						3		3
5	3	3	2	2	2							3		2

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BoS Chairman

K.S. Rangasamy College of Technology – Autonomous R2018								
51 CS L08 Python Programming for Data Analytics								
Open Elective								
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
	2	**0**	**2**	**45**	**3**	**50**	**50**	**100**

Objective(s)	• To know the basic python concepts • To understand the data wrangling and string manipulation • To understand data aggregation, group operation and time series • To learn web scrapping and CSS selectors • To visualize the data using packages in python
Course Outcomes	**At the end of the course, the students will be able to** CO1: Understanding the basic concepts of Python and data structures CO2: Understand the concept of data wrangling and various ways of combining and merging datasets CO3: Implement data aggregation and group operations and time series basics CO4: Gain the knowledge for Preparing and pre-processing of data, data aggregation and grouping concepts CO5: Leveraging web scraping and visualizing the results of analytics effectively

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Python Concepts

Interpreter – Program Execution – Statements – Expressions – Flow Controls – Functions - Numeric Types – Sequences - Strings, Tuples, Lists and - Class Definition – Constructors – Inheritance – Overloading – Text & Binary Files - Reading and Writing. [9]

Data Wrangling

Combining and Merging DataSets – Reshaping and Pivoting – Data Transformation – String Manipulation, Regular Expressions. [9]

Data Aggregation, Group Operations ,Timeseries

GoupBy Mechanics – Data Aggregation – Groupwise Operations and Transformations – Pivot Tables and Cross Tabulations – Date and Time Date Type tools – Time Series Basics – Data Ranges, Frequencies and Shifting. [9]

Web Scraping

Data Acquisition by Scraping web applications –Submitting a form - Fetching web pages – Downloading web pages through form submission – CSS Selectors. [9]

Visualization In Python

Matplotlib package – Plotting Graphs – Controlling Graph – Adding Text – More Graph Types – Getting and setting values – Patches. [9]

Total Hours : 45

Text book(s):

1	Mark Lutz, “Programming Python”, O'Reilly Media, 4th edition, 2010.
2	Mark Lutz, “Learning Python”, O'Reilly Media, 5th Edition, 2013

Reference(s) :

1.	Tim Hall and J-P Stacey, “Python 3 for Absolute Beginners”, Apress, 1st edition, 2009.
2.	Magnus Lie Hetland, “Beginning Python: From Novice to Professional”, Apress, Second Edition, 2005.
3.	Shai Vaingast, “Beginning Python Visualization Crafting Visual Transformation Scripts”, Apress, 2nd edition, 2014
4.	Wes Mc Kinney, “Python for Data Analysis”, O'Reilly Media, 2012
5.	White, “Hadoop: The Definitive Guide”, Third Edition - O’Reilly , 2012.

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6.	Brandon Rhodes and John Goerzen, “Foundations of Python Network Programming: The Comprehensive Guide to Building Network Applications with Python”,Apress, Second Edition, 2010.
7.	http://blog.matthewrathbone.com/2013/11/17/python-map-reduce-on-hadoop---a-beginners-tutorial.html
8.	http://www.michael-noll.com/tutorials/writing-an-hadoop-mapreduce-program-in-python/
9. 1	http://allthingshadoop.com/category/python/

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3										2		3
2	2	3	3		3							3		3
3	3	3	2		3				2	2	2	3		3
4	3	3	2		3			2	2	2	2	3		3
5	3	3	3		3			2	2	2	2	3		3

K. S. Rangasamy College of Technology – Autonomous R2018

50 CS L09 – Java Programming

Open Elective

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

Objective(s)

- To cram the fundamental element of the Java language.
- To communicate classes over objects using methods • To implement Packages, Interfaces and Exception handling.
- To understand the concept of Collections.
- To apply the knowledge of threads and to access remote data.

Course Outcomes

At the end of the course, the students will be able to

CO1: Understand the need of Platform independency by acquiring knowledge in architecture, Language basics and implementing Character and String Class

CO2: Express the concept of classes, objects and communicate classes over objects using methods

CO3: Implement Packages, Interfaces and handle various Checked and Unchecked Exceptions

CO4: Prompt the collection classes to implement various datastructures

CO5: Express the concept of thread execution with thread priority and to perform remote data access

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

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JAVA FUNDAMENTALS

Fundamentals of OOPs – Java Features – Java Architecture-Language Basics: set PATH, set CLASSPATH, Executing your first Java Program-Constants – Variables – Data types - Operators – Arrays –control statements – Character Class-Strings : String class, String Buffer class, String Builder Class and String handling methods [9]

CLASS and OBJECTS

Class – Object– Methods-Method overloading-Constructor-Constructor Overloading-Wrapper Class - Inheritance-Method Overriding-super-final-Garbage Collection [8]

PACKAGES, INTERFACES AND EXCEPTION HANDLING

Packages-Access specifiers -Built-in Packages, User defined Packages-Interfaces-Abstract Class-Exception Handling-try-catch-throw-throws-finally-finalize-Managing Predefined Exceptions- Creating and handling User defined Exceptions [11]

COLLECTIONS

Collections: Iterator, Enumerator, List, Set, Queue Vector and Map. [8] **MULTI THREADING AND JAVA NETWORKING**

Multi threading - Java Thread model – Main thread – creating thread – creating multiple thread – Thread priority – methods – synchronization – IPC, RMI – Basics – RMI Layer – Stub, Skeleton - RMI Implementation. [9]

Practice:

1. Implementation of Simple Java Programs
2. Implementation of Array based Logical Programs
3. Implementation of Character, String class
4. Demonstration of communication of classes over objects using getter, setter, constructor, methods 5. Implementation of various inheritance
6. Implementation of various datastructures using Collections
7. Implementation of different applications using packages, interfaces and to check abnormal conditions using exception handling.
8. Implementation of multi-tasking concepts using threads
9. Implementation of accessing remote data using RMI.
10. Mini – Project

Total Hours : 45+15=60 hours

Text book(s):

1. Herbert Schildt, "the Java 2: Complete Reference", Fifth edition, TMH,2002.
2. M. Heckler, “JavaFX 8: Introduction by Example”, Second Edition,Apress.

Reference(s) :

1.	https://www.tutorialspoint.com,
2.	https://www.javatpoint.com,
3.	https://beginnersbook.com
4.	https://www.journaldev.com,

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3											3	
2	2	3	3		2	2			2			2	3	
3	2	3	3		2				2			3	3	

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4	3	3	3		2	2			3				3	
5	3	3	3		2	2			3				3	

K.S. Rangasamy College of Technology – Autonomous R2018								
51 CS E11– Node.js and React.js								
Elective – I								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	2	0	2	45	3	50	50	100

Objective(s)	• To learn the runtime web development for easily building fast and scalable network applications. • To enhance the knowledge in event-driven and real-time applications that run across distributed devices. • To learn the streams and file systems in Node Js • To acquire the knowledge on web development and database connectivity • To Acquire the knowledge of MVC template on user interfaces using React JS
Course Outcomes	**At the end of the course, the students will be able to** CO1: Examine the fundamental structure of Node.js platform CO2: Affirm the concepts of NPM CO3: Interpret the concepts of streams and file systems CO4: Gain the knowledge of web content using node.js CO5: Annotate the various features of React js

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction to Node.js

The environment of Node.js - Benefits and Features - Install Node.js on Windows - Console and Web programs - Node.js REPL Commands [8]

NPM

Node.js Package Manager - Installing modules using NPM - Node.js Command Line Options - Node.js Errors

- Node.js DNS - Node.js Net [9]

Streams and File Systems

Node.js Creating Buffers - Node.js Streams - Node.js Piping Streams - Node.js Chaining Streams - Node.js File Systems [11]

Web Development

Node.js Web Module - Node.js html form handling - Node.js Database Connectivity [9] **Introduction to React.js**

The environment of React.js - Benefits and Features – components – state – lifecycle – events – forms – CSS

[8]

Total Hours: 45 hours

Text book(s):

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1.	Practical Node. jsBuilding Real-World Scalable Web Apps, AzatMardan,APRESS Publication, 2018.
2.	https://www.w3schools.com/nodejs,
Reference(s) :	
1.	Node.js in Action, Alex Young, Bradley Meck, Mike Cantelon, Manning Publications, 2017
2.	Learning React, Alex banks & Eve Porcello, O'Reilly Publications, 2017.
3.	https://www.w3schools.com/REACT/default.asp
4	https://www.tutorialspoint.com/nodejs/nodejs_introduction.htm,

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	2		3			2	3	2		3	2	
2	2	3	2		3			2	3	2		3	2	
3	2	3	2	2	3			2	3	2		3	2	
4	2	3	2	2	3			2	3	2		3	2	
5	2	3	2		3			2	3	2		3	2	

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K. S. Rangasamy College of Technology – Autonomous R2018

51 CS L03 / 51 CS E12 C# and .NET Core

Elective – I

Semester	Hours / Week			Total hrs.	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	2	0	2	45	3	50	50	100

Objective(s)

- To gain the fundamental skills in C# programming Language
- To gain knowledge in object-oriented concepts in C#
- To understand the concepts of the .NET Core and its platform
- To implement data manipulation using Razor pages
- To enhance the knowledge in Model-View-Controller architecture

Course Outcomes

At the end of the course, the students will be able to

CO1: Know the basic concepts of C#
CO2: Understand the Object-Oriented concepts in C#
CO3: Ability to develop web pages using ASP.NET Core platform
CO4: Implement the data manipulation concept using Razor Pages
CO5: Integrate the concept of MVC in ASP.NET Core platform

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction to C#:

Introducing C# – Understanding .NET – Overview of C# – Literals – Variables – Data Types – Operators – Expressions – Branching – Looping – Methods – Arrays – Strings – Structures – Enumerations. [8]

Object-Oriented Programming in C#:

Classes – Objects – Inheritance – Methods – Polymorphism – Interfaces – Operator Overloading – Delegates – Events – Errors – Exceptions – Collections – Managing File system. [8]

ASP.NET Core Web Application using Razor Pages:

Introduction to ASP.NET Core Web Application – Environment Setup – Project Layout – Static and Default Files - Enabling and Defining Razor Pages – Shared Layouts – Using code-behind files. [10]

Data Manipulation using Razor Pages:

Introduction to ADO.NET – Connection Class with Authentication – Command Class – DataReader Class – DataAdapter Class – DataSet – OnGet –OnPost – OnPostDelete – OnPostEdit – OnPostView – REST API – Model and Controller for REST API. [10]

Model-View-Controller (MVC) in ASP.NET Core:

Introduction to MVC – Setting up an ASP.NET Core MVC Website – MVC Routing – Controllers and Actions – Model – Views – Parameters Passing – View Helpers – Model Validation. [9]

Total Hours: 45 hours

Text book(s):

1. Mark J. Price, “C# 8.0 and .NET Core 3.0 – Modern Cross-Platform Development”, 4th Edition, Packt Publishing Limited, 2019.
2. Dino Esposito, “Programming ASP.NET Core”, 1st Edition, Pearson Education Inc., 2018

Reference(s):

1. https://docs.microsoft.com/en-us/aspnet/core/
2. Christian Nagel, “Professional C# 7 and .NET Core 2.0”, 1st Edition, Wiley Publication, 2018
3. Andrew Troelsen Phil Japikse,” Pro C# 8 with .NET Core 3: Foundational Principles and Practices in Programming”, Apress, 2020

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4	Jon Skeet," C# in Depth",Fourth Edition, 2019

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2	2					1		3	2	
2	3	3			2					2		1	3	
3	3	3		3	2					3		3	3	
4	3	2	2		2					3		3	3	
5	3	3		3	2					3		3	3	

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51 CS E13 \ 51 CS L06 R Programming

Elective – I

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	2	0	2	45	3	50	50	100

Objective(s)

- To introduce basic concepts in R programming
- To emphasis is on various data structures in R
- To understand the R programming fundamentals
- To work with data in R programming
- To work with strings and dates in R Programming

Course Outcomes

At the end of the course, the students will be able to

CO1: Elucidate the history and overview of R Programming

CO2: Explore data structures in R Programming

CO3: Implement the R program using loops and functions

CO4: Manipulate the information using file

CO5: Implement string operations and dates in R

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

History and Overview of R

What is R? - What is S? - The S Philosophy - Back to R - Basic Features of R - Free Software - Design of the R System - Limitations of R - R Resources . [9]

R – Basics and Data structures in R

Math, Variables, and Strings - Vectors and Factors - Vector operations - Arrays & Matrices – Lists – Dataframes – Missing Values – Names [9]

R Programming Fundamentals

Conditions and loops - Functions in R - Objects and Classes – Debugging [9]

Working with Data in R

Reading CSV and Excel Files - Reading text files -Writing and saving data objects to file in R [9]

Strings and Dates in R

String operations in R - Regular Expressions - Dates in R -Times in R- Operations on Dates and Times[9]

Total Hours: 45 hours

Text book(s):

1. Roger D.Peng, "R programming for Data Science", 1st Edition, 2015 Lean Publications.
2. **Hardley Wickham,Garrett Grolemund "**R for data science : Import, Tidy, Transform, Visualize, And Model Data", Orielly Publications, 2017

Reference(s) :

5. https://cognitiveclass.ai/courses/r-101/
6. https://www.tutorialspoint.com/r/index.htm
7. **Nina Zumel, John Mount**, "Practical Data Science With R", Manning Publisher, 2014.
8. https://www.datamentor.io/r-programming/

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

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1		2											3
2	2	3	3		2							2	2	3
3	2	3	3		2							2	2	3
4	2	3	3		2							2	2	3
5	2	3	3		2							2	2	3

Passed in BoS Meeting held on 22/12/2022
Approved in Academic Council Meeting held on 07/01/2023

BoS Chairman

K.S. Rangasamy College of Technology – Autonomous R2018								
51 CS E14 – PHP programming								
Elective – I								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	2	0	2	45	3	50	50	100

Objective(s)	• To get an overview of what's possible with PHP programs • To learn language fundamentals, including data types, variables, operators, and flow control statements • To recognize functions and strings. • To work single and multidimensional arrays • To interact with relational databases like MySQL or NoSQL databases such as MongoDB
Course Outcomes	**At the end of the course, the students will be able to** CO1: Comprehend the PHP, installation of PHP and language basics. CO2: Recognize the concept of functions and its types CO3: Grasp the concept of strings and regular expressions CO4: Recognize the concept of arrays and its types **CO5:** Comprehend the accessing of a database and various relational databases

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction to PHPand Language Basics

What Does PHP Do?-A Brief History of PHP-Installing PHP-A Walk Through PHP

Language Basics: Lexical Structure-Data Types-Variables-Expressions and Operators-Flow-Control Statements-Including Code-Embedding PHP in Web Pages [11]

Functions

Calling a Function-Defining a Function-Variable Scope-Function Parameters-Return Values-Variable Functions-Anonymous Functions [7]

Strings

Quoting String Constants-Printing Strings-Accessing Individual Characters-Cleaning Strings-Encoding and Escaping-Comparing Strings-Manipulating and Searching Strings-Regular Expressions [8]

Arrays

Indexed Versus Associative Arrays-Identifying Elements of an Array-Storing Data in Arrays-Multidimensional Arrays-Extracting Multiple Values-Converting Between Arrays and Variables-Traversing Arrays-Sorting-Acting on Entire Arrays-Using Arrays-Iterator Interface [11]

Databases

Using PHP to Access a Database-Relational Databases and SQL-MySQLi Object Interface-SQLite-Direct File-Level Manipulation-MongoDB [8]

Total Hours: 45 hours

Text book(s):

1. Rasmus Lerdorf, Kevin Tatroe, Peter MacIntyre,"Programming PHP",3rd edition,O'Reilly,2013
2. Kevin Tatroe, Peter MacIntyre,"Programming PHP:Creating Dynamic Web Pages",4th edition,O'Reilly,2020

Reference(s) :

1. Luke Welling,Laura Thomson,"PHP and MYSQL development",2nd edition,Sams publishing,2003
2. Luke Welling,Laura Thomson,"PHP and MYSQL development",4th edition,Pearson education,2010
3. Brett McLaughlin,"PHP & MySQL: The Missing Manual",3rd edition,O'Reilly,2012
4. Steven Holzner,"PHP: The Complete Reference",McGrawHill Education,2017

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

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1	3	2	3	2	3				3	2			3	
2	3	2	3	2	3	2	2		3	2			3	
3	3	2	3		3	2			3	2		3	3	
4	3	2	3		3			3	3	2		3	3	3
5	3	2	3	2	3	2	1	3	3	2		3	3	3

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K.S. Rangasamy College of Technology – Autonomous R2018								
50 CS E15-Parallel and Distributed Computing								
Elective – I								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	50	50	100

Objective(s)	• To understand the need and fundamentals of parallel computing paradigms • To learn the nuances of parallel algorithm design • To understand the programming principles in parallel computing architectures • To learn few problems that are solved using parallel algorithms • To learn fault tolerant techniques and various algorithms
Course Outcomes	**At the end of the course, the students will be able to** CO1: Understanding the requirements of Parallel Computing CO2: Apply the knowledge of different types of methodologies like mapping techniques CO3: Recognize the concept of message passing and shared address space CO4: Review the concepts of distributed computing paradigm with applications CO5: Apply the knowledge of fault tolerant techniques

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

INTRODUCTION TO PARALLEL COMPUTING

Scope of Parallel Computing – Parallel Programming Platforms – Implicit Parallelism – Limitations of Memory System Performance – Control Structure of Parallel Platforms – Communication Model of Parallel Platforms – Physical Organization of Parallel Platforms – Communication Costs in Parallel Machines – Impact of Process - Processor Mapping and Mapping Techniques. [9]

PARALLEL ALGORITHM DESIGN

Preliminaries – Decomposition Techniques – Characteristics of Tasks and Interactions – Mapping Techniques for Load Balancing – Methods for Containing Interaction Overheads – Parallel Algorithm Models – Basic Communication Operations – One-to-All Broadcast and All-to-One Reduction – All-to-All Broadcast and Reduction – All-Reduce and Prefix Sum Operations – Scatter and Gather – All-to-All Personalized Communication- Circular Shift – Improving the Speed of some Communication Operations . [9]

PROGRAMMING USING MESSAGE PASSING AND SHARED ADDRESS SPACE

Principles of Message Passing Programming – Building Blocks – Send and Receive Operations – MPI – Message Passing Interface – Topologies and Embedding – Overlapping Communication with Computation – Collective Communication and Computation Operations – Groups and Communicators – POSIX thread API – OpenMP: a Standard for Directive based Parallel Programming – Applications of Parallel Programming - Matrix-Matrix Multiplication – Solving Systems of Equations – Sorting Networks - Bubble Sort Variations – Parallel Depth First Search [9]

DISTRIBUTED COMPUTING PARADIGM

Paradigms for Distributed applications – Basic algorithms in Message passing Systems – Leader Election in Rings – Mutual Exclusion in Shared Memory. [9]

FAULT TOLERANT DESIGN

Synchronous Systems with Crash Failures – Byzantine Failures – Impossibility in Asynchronous Systems - Formal Model for Simulation – Broadcast and Multicast – Specification of a Broadcast Service – Implementing a Broadcast Service – Multicast in Groups – Distributed Shared Memory – Linearizable – Sequentially Consistent Shared Memory – Algorithms [9]

Total Hours: 45 hours

Text book(s):

1. Ananth Grama, Anshul Gupta, George Karypis and Vipin Kumar, “Introduction to Parallel Computing”, Second Edition, Pearson Education, 2009.
2. Haggit Attiya and Jennifer Welch, “Distributed Computing – Fundamentals, Simulations and Advanced Topics”, Second Edition, Wiley, 2012.

Reference(s) :

1. Michael Quinn, “Parallel Computing - Theory and Practice”, Second Edition, Tata McGraw Hill, 2002.
2. Norman Matloff, “Parallel Computing for Data Science – With Examples in R, C++ and CUDA”, Chapman and Hall/CRC, 2015.

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3.	Wan Fokkink, “Distributed Algorithms: An Intuitive Approach”, MIT Press, 2013.
4.	M.L. Liu, “Distributed Computing – Principles and Applications”, First Edition, Pearson Education, 2011.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	3		1							2		3
2	2	1	3	3	2							1		3
3	2	3	1	3	3							1		3
4	3	3	2								1	2		3
5	2	3	3	2	1							1		3

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51 CS E21 -Cryptography and Network Security

Elective – II

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	2	45	3	50	50	100

Objective(s)	• To know about various encryption techniques. • To understand the concept of Public key cryptography and number theory. • To study about message authentication and hash functions • To impart knowledge on Network security and web security • To impart knowledge on System level security and practical implementation
Course Outcomes	**At the end of the course, the students will be able to** CO1: Understand the concept of classical and modern encryption techniques CO2: Explore the concept of public key cryptography by understanding various concept of number theory CO3: Recognize the various authentication and hash functions CO4: Analyze the E-mail, Web and IP Security principles CO5: Managing the intrusion detection, attacks of viruses by applying the principles of firewalls and performing the practical implementation of cryptography and network security

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

Introduction

OSI Security Architecture-Classical Encryption Techniques-Cipher Principles-Data Encryption Standard- Cipher Design Principles and Modes of Operation -Double DES-Triple DES-AES - Blowfish-RC5 algorithm [9] **Number Theory and Public key cryptography**

Finite Fields and Number Theory- Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm-Finite fields-Polynomial Arithmetic –Prime numbers-Fermat's and Euler's theorem-Testing for primality -The Chinese remainder theorem- Discrete logarithms-Key management - Diffie-hellman key exchange- Elliptic Curve Arithmetic and Cryptography- Key distribution- Public Key Cryptography and RSA. [10] **Authentication and hash function**

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 – SHA – HMAC – CMAC – Digital signature and authentication protocols – DSS – EI Gamal – Schnorr. [9]

Network Security

Kerberos – X.509 Authentication services- E-mail Security -Pretty Good Privacy-S/MIME-IPSecurity -Web Security

[9]

System level security

Intrusion Detection System – Virus and related threats – Countermeasures – Firewalls and types- design principles – Practical implementation of cryptography and security.

[8]

Text book(s):

1.	William Stallings, "Cryptography And Network Security –Principles and Practices", Prentice Hall of India, Fifth Edition, 2012
2.	Bruce Schneier," Applied Cryptography"

Reference(s) :

1.	William Stallings, "Cryptography And Network Security –Principles and Practices", Pearson, Seventh Edition, 2016
2.	Behrouz A.Forouzan, "Cryptography And Network Security", McGraw-Hill Education, First Edition, 2007

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3.	Niels Ferguson, “Cryptography Engineering: Design Principles and Practical Applications”, Wiley, First Edition, 2010
4.	Jean-Philippe Aumasson,” SERIOUS CRYPTOGRAPHY A Practical Introduction to Modern Encryption”, William Pollock publisher,1st Edition,2018

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2						2	2		3		2
2	3	3	2	2	3	3	2		2	2		3	2	
3	3	3	2		3	3	2		2	2		3	2	
4	3	3	2		3	3	2	2	2	2		3	2	2
5	3	3	2	2	3	3	2	2	2	2		3	2	2

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K.S. Rangasamy College of Technology – Autonomous R2018								
51 CS E22 - Mobile Application Development								
Elective – II								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	2	45	3	50	50	100

Objective(s)	• To impart knowledge in Android Application Development • Understand the app idea and design user interface/wireframes of mobile app and set up the mobile app development environment • Develop and debug mobile app components –User interface, services, notifications, broadcast receivers, data components • Using emulator to deploy and run mobile apps • Testing mobile app -unit testing, black box test
Course Outcomes	**At the end of the course, the students will be able to** CO1: Analyze the Mobility landscape and platforms CO2: Familiarize with Mobile apps development aspects using android apps development platform with key focus on user experience design CO3: Understand the native data handling and background tasks and notifications, hardware play, location awareness. CO4: Review about graphics and animation and Multimedia CO5: Perform testing, signing, packaging and distribution of mobile apps, versioning mobile apps

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

GETTING STARTED WITH MOBILITY

Mobility landscape, Mobile platforms, Mobile apps development, Overview of Android platform, setting up the mobile app development environment along with an emulator, a case study on Mobile app development [6]

BUILDING BLOCKS OF MOBILE APPS

App user interface designing –mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity- states and life cycle, interaction amongst activities. App functionality beyond user interface -Threads, Async task, Services –states and lifecycle, Notifications, Broadcast receivers, Telephony and SMS APIs Native data handling –on-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet) [14]

SPRUCING UP MOBILE APPS

Graphics and animation –custom views, canvas, animation APIs, multimedia –audio/video playback and record, location awareness, and native hardware access (sensors such as accelerometer and gyroscope) [10]

TESTING MOBILE APPS

Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk [9]

TAKING APPSTO MARKET

Versioning, signing and packaging mobile apps, distributing apps on mobile market place [6]

Total Hours: 45 hours

Text book(s):

1.	Anubhav Pradhan,Anil V.Deshpande,"Composing Mobile Apps: Learn/Explore/Apply/ Using Android", Wiley India Private Limited, 1st Edition,2014.
2	Dr. Madhu Goel, Chetna Sharma, ER. SHOBHIT," Mobile Application Development", ISHAN PUBLICATIONS,2020

Reference(s) :

1.	Frank Ableson W, Sen R ,Chrisking, "Android in Action", Dream tech Press, New Delhi, 3rd Edition,2012.

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2.	Rodger," Beginning Mobile Application Development In The Cloud", Wiley Publication,2011
3.	Carmen Delessio," Android Application Development In 24 Hours", 4th Edition, Pearson Education

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	3	3	3			2			2	3	
2	2	2	2	3	3	2			2			2	3	
3	3	3	3	3	3	3	3		2	3	3	2	3	
4	3	2	3	3	3				2	3	3	2	3	
5	3	3	3	3	3	3	3	3	2	3	3	2	3	

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51 CS E23 - Scripting Languages

Elective – II

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	2	45	3	50	50	100

Objective(s)

- To learn various scripting languages
- To understand the basic of JQuery
- To learn Ruby and working with web
- To learn the basics of TCL
- To learn the advanced concepts of TCL

Course Outcomes

At the end of the course, the students will be able to

CO1: Understand the concept Scripting and JavaScript
CO2: Explore the concept of JQuery
CO3: Understanding use of Ruby CO4:
Analyze the structure of TCL
CO5: Explore the commands and issues in TCL

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

Introduction to Scripting and JavaScript

Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting languages, Web Scripting, and the universe of Scripting Languages, what is JavaScript – Object models – Design philosophy – Versions of JavaScript – The JavaScript core language – System objects – Advanced facilities – JavaScript and Java – JavaScript operators and precedence. **[9]**

JQuery Introduction to jQuery -Using jQuery Core -jQuery Events – jQuery Effects - AJAX and JQuery - HTML5 Forms and JQuery UI **[10]**

Ruby Introduction: Ruby, Rails, the structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services, RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling. **[8]**

Introduction to TCL TCL structure, syntax, variables and data in TCL, control flow, data structures, input/output, procedures, strings, patterns, files. **[8]**

Advanced TCL Eval, source, exec and up level commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts internet programming, Security issues, C interface, Java interface. **[10]**

Text book(s):

1. David Barron: “The World of Scripting Languages”, 1st Edition, Wiley publications.
2. David Flanagan, Yukihiro Matsumoto: “The Ruby Programming Language”, O’Reilly Media,.

Reference(s) :

1. John Ousterhout, Ken Jones: “Tcl and the Tk Toolkit”, 2nd Edition, Pearson education.
2. Dabve Thomas, “Programming Ruby: The Pragmatic Programmers' Guide” Secondedition
3. https://api.jquery.com/
4. Alex Libby, “Mastering jQuery”, Packet Publications first edition,2015

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

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1					3					2	2	3	2	
2	2	2	2	2	3					2	2	3	2	2
3	2	2	2	2	3					2	2	3	2	2
4	2	2	2	2	3					2	2	3	2	2
5					3					2	2	3	2	

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BoS Chairman

K.S. Rangasamy College of Technology – Autonomous R2018								
51 CS E24 - User Interface Technologies								
Elective – II								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	2	45	3	50	50	100

Objective(s)	• To understand User Interface design and web languages • To understand the web applications and and client server communication • To program for web client and web server objects • To understand web development environment and methodology • To learn the reactive frameworks
Course Outcomes	**At the end of the course, the students will be able to** CO1: Understand the User Interface Design essentials and scripting language CO2: Develop Web Applications and Implement Client/Server Web programming CO3: Recognize the Web servers and frameworks CO4: Understand MongoDB and Node Js applications CO5: Apply Reactive Frameworks

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

Introduction to UI Design and Client side scripting

Introduction-The process of UI design-Elements-Good Vs Bad UI –Web Design issues-HTML –XHTML-CSS-Javascript Basics –Arrays-Functions –Javascript objects –HTML DOM -DOM methods –Events-Regular Expressions –Form Validation-JSON-Jquery [14]

Web applications and Client-Server Communications

Web applications-Web Application Frameworks-MVC framework-Angular JS –Single Page Applications-Responsive Web Design-HTTP-Request/Response Model-HTTP Methods-RESTful APIs-AJAX-AJAX with JSON [9]

Webservers

Node.js- NPM-Callbacks –Events-Express framework-Cookies-Sessions-Scaling [7]

Storage

MongoDB-Manipulating and Accessing MongoDB Documents from Node js [7]

Reactive Frameworks

Meteor JS framework –Templates –Events –Sessions –Publish & Subscribe –Accounts [8]

Total Hours: 45 hours

Text book(s):

1. Brad Dayley, Node.js, MongoDB, and Angular JS Web Development, Addison Wesley, 2014
2. Jenifer Tidwell, Charles Brewer, Aynne Valencia “Designing Interfaces”, 3rd edition, O’rielly Publication ,2020

Reference(s) :

1. Jon Duckett,HTML & CSS Design and Build Websites, Wiley, 2011
2. Jon Duckett,JavaScript and Jquery: Interactive Front-End Web Development,Wiley,2014
3. Holdener, Ajax: The Definitive Guide,Oreilly,2010
4. http://cfg.cit.cornell.edu/cfg/design/contents.html

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

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1			3	2	3							2	3	
2			3	2	3							2	3	
3			3	2	3							2	3	
4			3	2	3							2	3	2
5			3	2	3							2	3	2

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BoS Chairman

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50 CS E25 – High Speed Networks

Elective – II

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	50	50	100

Objective(s)

- To highlight the features of different technologies involved in High Speed Networking and their performance.
- To acquire the knowledge of congestion and traffic management
- To study about performance of TCP and ATM congestion control
- To learn integrated and differentiated services in high speed networks
- To understand the working principles of various protocols

Course Outcomes

At the end of the course, the students will be able to

CO1: Gain the Knowledge about introduction about ATM and Frame relay

CO2: Understanding and an up-to-date survey of developments in High Speed Networks CO3: Analyze the techniques involved to support real-time traffic and congestion control

CO4: Exploring integrated and differentiated services

CO5: Exploring different levels of quality of service (Q.S) to different applications

High Speed Networks

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LANs: Fast Ethernet– WirelessLANs: applications, requirements – Architecture of 802.11. [9]

Congestion and Traffic Management

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks**.** [8]

TCP and ATM congestion control

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO back off – KARN's Algorithm – Window management – Performance of TCP over ATM Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations. [11]

Integrated and Differentiated Services

Integrated Services -Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection. [8]

Protocols for QoS Support

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol. [9]

Text book(s):

1	William Stallings, "High Speed Networks and Internet", Pearson Education, Second Edition, 2002.
2	Warland, Pravin Varaiya, "High performance communication networks", SecondEdition, Jean Harcourt Asia Pvt. Ltd., 2001.

Reference(s):

1	Fred Halsall,"Multimedia Communications: Applications, Networks, Protocols, and Standards",Pearson, Fourth edition,2009
2	Irvan Pepelnjk, Jim Guichard, Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003
3	Abhijit S. Pandya, Ercan Sea, "ATM Technology for Broad Band Telecommunication Networks", CRC Press, New York, 2004.
4	Mahbub Hassan,"High Performance TCP/IP Networking: Concepts, Issues, and Solutions"PHI,2005

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CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	3									2		
2	2	3	3									2		
3	2	3	3	2	3							2	2	2
4	2	3	2	2	3							2	2	2
5	2	3	2	2	3							2	2	2

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BoS Chairman

K.S. Rangasamy College of Technology – Autonomous R2018								
51 CS E31/51 CS L07 Artificial Intelligence								
Elective – III								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	2	45	3	50	50	100

Objective(s)	• Understand the fundamentals of problem solving. • Interpret the knowledge and reasoning in propositional logic and first order logic. • Gain knowledge on Planning and acting in the real world. • Learn to represent uncertain knowledge in solving AI problems • Understand the different forms of learning.
Course Outcomes	**At the end of the course, the students will be able to** CO1:Understand the concepts of intelligent agents and problem solving aspects. CO2: Interpret the knowledge of propositional logic and FOL. CO3: Understand the issues of planning problems. CO4: Describe the Uncertainty and probabilistic reasoning. CO5: Summarize the types of learning methods and AI applications.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Problem Solving

Introduction - What is Artificial Intelligence? – Structure of Intelligent Agents –Problem formulation – Uninformed search strategies – Informed search strategies – Constraint satisfaction problems [9] **Knowledge and Reasoning**

Logical agents – Propositional logic – First-order logic – Inference in first order logic – Unification - Forward Chaining – Backward Chaining – Resolution [9]

Planning

Planning Problem - Planning with state-space search – Partial-order planning – Planning graphs - Planning and acting in the real world - Conditional planning - Multi agent planning. [9] **Uncertain Knowledge and Reasoning**

Uncertainty – Notations and Axioms of Probability - Probabilistic Reasoning – Bayesian networks (Semantics, Exact Inference, Approximate Inference) – Inference in Temporal models – Hidden Markov models [9] **Learning and Applications**

Learning from observation -Inductive learning –Decision trees – Ensemble Learning - Explanation based learning – Statistical Learning methods. Applications of Artificial intelligence. [9]

Total Hours: 45 hours

Text book(s):

1.	S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, Third Edition, Pearson Education, 2009.
2	Melanie Mitchell,” Artificial Intelligence: A Guide for Thinking Humans”, Farrar, Straus and Giroux Publisher,2019

Reference(s) :

1.	Dan W. Patterson, “Introduction to AI and ES”, Third Edition, Pearson Education, 2007.
2.	Nils J. Nilsson, “The Quest for Artificial Intelligence”, Cambridge University Press, 2009.
3.	Nptel course, Artificial Intelligence, https://nptel.ac.in/courses/106106126/
4.	Stuart Russell,” Human Compatible – Artificial Intelligence and the Problem of Control”,Viking publisher,2019

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2	2							2		

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2	3	3	2	2	2							2		2
3	3	2	2	2	2	2						2		
4	3	2	2	2	2	2						3		
5	3	3	2	2	2							3		2

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K.S.Rangasamy College of Technology – Autonomous R2018								
51 CS E32- Semantic Web								
Elective – III								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	2	45	3	50	50	100

Objective(s)	• Introducing basic concepts, tasks, methods, and techniques in semantic web • To understand the concept of RDF and its schemas • To learn the ontology and semantic web architecture • To construct logic and inference and rule markup in XML • Understanding of the semantic web process and issues.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Gain knowledge in Semantic Web and its Technologies CO2: Construct the RDF data model and defining the vocabularies used in RDF data model CO3: Identify the requirements of Ontology and know the sublanguages CO4: Write the Monotonic and Non monotonic Rules CO5: Realize the applications of semantic web technologies

Introduction

History – Semantic Web Layers –Semantic Web technologies – Semantics in Semantic Web – XML**:** Structuring – Namespaces – Addressing – Querying – Processing [9]

RDF

RDF and Semantic Web – Basic Ideas - RDF Specification – RDF Syntax: XML and Non- XML - RDF elements – RDF relationship: Reification, Container, and collaboration – RDF Schema –Editing, Parsing, and Browsing RDF/XML-RQL-RDQL [9]

Ontology

Why Ontology – Ontology movement – OWL – OWL Specification - OWL Elements –OWL constructs: Simple and Complex – Ontology Engineering : Introduction –Constructing ontologies – Reusing ontologies – On-To-Knowledge Semantic Web architecture [9]

Logic and Inference

Logic – Description Logics - Rules – Monotonic Rules: Syntax, Semantics and examples – Non- onotonic Rules – Motivation, Syntax, and Examples – Rule Markup in XML: Monotonic Rules, and Non-Monotonic Rules [9]

Applications of Semantic Web Technologies

RDF Uses: Commercial and Non-Commercial use – Sample Ontology – e-Learning –Web Services – Web mining – Horizontal information – Data Integration – Future of Semantic Web [9]

Text book(s):

1	Grigorous Antoniou and Van Hermelen - “A Semantic Web Primer”-The MIT Press –2004
2	Spinning the Semantic Web: Bringing the world wide web to its full potential – The MIT Press – 2004

Reference(s):

1	Shelley Powers – “Practical RDF” – O’reilly publishers – First Indian Reprint :2003
2	Markus Kroetzsch, Pascal Hitzler, and Sebastian Rudolph,” Foundations of Semantic Web Technologies”, CRC press,2009
3	Grigoris Antoniou,Frank van Harmelen,” A Semantic Web Primer”MIT, 2nd Edition, Press,2020
4	https://www.w3.org/standards/semanticweb/

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	3	2		2			2	2	2	3		3
2	2	3	3	2	3	2			2	3	3	3	2	3
3	2	3	3	2		2	2		2	2	2	3		3

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BoS Chairman

4	2	3	3	2		2	2		2	2	2	3		3
5	2	2	2	2	3	2	2		2	3	3	3	2	3

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BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2018								
51 CS E33- Big Data Security								
Elective – III								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	2	45	3	50	50	100

Objective(s)	• To know the fundamentals of big data security and organizational security. • To analyses the security, Compliance, Auditing and Protection. • To know the steps to construct big data and classification of big data • To study the Hadoop security design and configuration • To study about data security and event logging
Course Outcomes	**At the end of the course, the students will be able to** CO1: Know the fundamental of Big data privacy, ethics and security CO2: Analyses the security, Compliance, Auditing and Protection. CO3: Construct security design using Hadoop CO4: Configuring Hadoop ecosystem security CO5: Analyze data security and event logging.

Big Data Privacy, Ethics and Security

Privacy – Re-identification of Anonymous People – Why Big Data Privacy is self-regulating? – Ethics – Ownership – Ethical Guidelines – Big Data Security – Organizational Security. [9]

Security, Compliance, Auditing, and Protection

Steps to secure big data – Classifying Data – Protecting – Big Data Compliance – Intellectual Property Challenge – Research Questions in Cloud Security – Open Problems. [9]

Hadoop Security Design

Kerberos – Default Hadoop Model without security - Hadoop Kerberos Security Implementation & Configuration.[9]

Hadoop Ecosystem Security

Configuring Kerberos for Hadoop ecosystem components – Pig, Hive, Oozie, Flume, HBase, Sqoop. [9] **Data Security & Event Logging**

Integrating Hadoop with Enterprise Security Systems - Securing Sensitive Data in Hadoop – SIEM system – Setting up audit logging in hadoop cluster [9]

Text book(s):

1	Ron schmelzer et al, “XML and Web Services”, Pearson Education, 2002.
2	SandeepChatterjee and James Webber, “Developing Enterprise Web Services: An Architect’s Guide”, Prentice Hall, 2004.

Reference(s):

1	Frank P. Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, 2002.
2	Keith Ballinger, “.NET Web Services Architecture and Implementation”, Pearson Education, 2003.
3	Henry Bequet and MeerajKunnumpurath, “Beginning Java Web Services”, Apress, 2004.
4	Russ Basiura and Mike Batongbacal, “Professional ASP.NET Web Services”, Apress,

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	3		3	2						2		
2	2	3	3	3	3	2		3				2		3
3	2	3	3		3	2			2		2	2	3	
4	2	3	3		3	2			2		2	2	3	
5	2	3	3	3	3	2		3				2	3	3

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BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2018								
50 CS E34 - XML and Web Services								
Elective – III								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	50	50	100
Objective(s)	• To provide an in-depth knowledge of XML and Web Services. • To understand the fundamental concepts of Web services. • To understand the fundamental concepts of XML Technology. • To design Web service Architecture. • To Study Building Blocks of Web services and content management using XML							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Know the fundamental elements in XML and XML Technologies and schemes CO2: Design and analysis the Architecture of Web Services. CO3: Construct building blocks of Web services CO4: Design XML web service in E-Business and implement xml in E-Business CO5: Analyze Content Management in XML.							

Xml Technology Family

XML – benefits – Advantages of XML over HTML – EDL –Databases – XML based standards – DTD –XML Schemas – X- Files – XML processing – DOM –SAX- presentation technologies – XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH –XQ [9]

Architecting Web Services

Business motivations for web services – B2B – B2C- Technical motivations – limitations of CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime [9]

Web Services Building Block

Transport protocols for web services – messaging with web services – protocols – SOAP – describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI- Web service inspection – Ad- Hoc Discovery – Securing web services. [9]

Implementing Xml In E-Business

B2B – B2C Applications – Different types of B2B interaction – Components of e-business XML systems – ebXML – Rosetta Net Applied XML in vertical industry – Web services for mobile devices. [9]

Xml And Content Management

Semantic Web – Role of Meta data in web content – Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG –WSFL. [9]

Text book(s):

1	Ron schmelzer et al, “XML and Web Services”, Pearson Education, 2002.
2	SandeepChatterjee and James Webber, “Developing Enterprise Web Services: An Architect’s Guide”, Prentice Hall, 2004.

Reference(s):

1	Frank P. Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, 2002.
2	Keith Ballinger, “.NET Web Services Architecture and Implementation”, Pearson Education, 2003.
3	Henry Bequet and MeerajKunnumpurath, “Beginning Java Web Services”, Apress, 2004.
4	Russ Basiura and Mike Batongbacal, “Professional ASP.NET Web Services”, Apress,

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CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1		2	2									3	2	
2	3	2	2	2	3			3	3	3		3	2	
3	3	2	2	2	3			3	3	3		3	2	
4	3	2	2	2	3			3	3	3		3	2	
5		2	2	2	3			3	3	3		3	2	

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BoS Chairman

K.S.Rangasamy College of Technology – Autonomous R2018								
50 CS E35 - Information Storage and Management								
Elective – III								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	50	50	100

Objective(s)	• To study the concepts of storage architecture and architecture • To learn about various storage networking technologies • To understand NAS and object based and unified storage • To study backup and archives and business impact analysis • To provide comprehensive learning of storage technology, allow to make more informed decisions in an increasingly complex IT environment.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Understand the origin of storage systems and observe the virtualization CO2: Classify the connectivity between the storage devices and servers CO3: Apprehend the network attached storage in sharing environment CO4: Revise the data backup the data archive in the event of data loss CO5: Analyze the concept of local replication technologies

Introduction To Information Storage

Information Storage – evolution of storage architecture – data center infrastructure – virtualization and cloud computing. Data Center Environment: host – connectivity – disk dive performance – DAS benefits and limitations – flash drives. Intelligent Storage Systems: components – storage provisioning – types of Intelligent storage system[9]

Storage Networking Technologies

Fibre Channel Storage Area Networks: components – FC connectivity – switched fabric ports – FC architecture – fabric services – switched fabric login types – zoning – FC SAN topologies – virtualization in SAN. IP SAN and FcoE: iSCSI – FCIP – FcoE [9]

Network Attached Storage

NAS: Benefits – file sharing and network file sharing – components – I/O operations – implementations – file sharing protocols – factors affecting NAS performance – file level virtualization. Object-Based and Unified Storage: Object-Based storage devices – content-addressed storage – CAS use case – Unified storage. [9] **Backup and Archive**

Introduction to Business Continuity: Information Availability – BC: terminologies – planning life cycle – failure analysis – business impact analysis – technology solutions. Backup: Purpose – considerations – granularity – methods – architecture – operations – topologies – backup in NAS environments – targets – data duplication for backup – Data Archive. [9]

Replication

Local replication: terminology – uses – replica consistency – technologies – restore and restart considerations – virtualization environment. Remote replication: modes – technologies – migration in virtualization environment. [9]

Text book(s):

1	Somasundaram Gnanasundaram, AlokShivastava, Information Storage and Management, (storing, managing and protecting digital information in classic, virtualization and cloud environments), EMC2Corporation, Second Edition Wiley India, 2010.

Reference(s):

1	Robert Spalding, storage Networks: The Complete Reference, Tata McGraw Hill, Osborne, 2003.
2	Marc Farley, Building Storage Networks, Tata McGraw Hill, Osborne, 2001.
3.	EMC^2,"Information Storage and Management: Storing, Managing, and Protecting Digital Information" EMC Education Services,2009
4.	Ulf Troppens, Ulf Troppen, Rainer Erkens" Storage Networks Explained: Basics and Application of Fibre Channel SAN",2nd edition,wiley publisher,2008

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

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1	3	3	3								2	3	
2	3	2	2								2	3	2
3	3	2	3			2					2	3	2
4	3	2	2			2					2	3	2
5	3	2	2								2	3	

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K.S. Rangasamy College of Technology – Autonomous R2018

50 CS E41–MOBILE AD HOC NETWORKS

Elective – IV

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	2	0	2	45	3	50	50	100

Objective(s)	• To compare the differences between cellular and ad hoc networks and the analyse the challenges at various layers and applications • To summarize the protocols used at the MAC layer and scheduling mechanisms • To examine the network security solution and routing mechanism • To evaluate the energy management schemes and Quality of service solution in ad hoc networks • To understand the architecture and protocols used in Wireless Sensor Networks.
Course Outcomes	**At the end of the course, the students will be able to** CO1.Understand the principles of mobile ad-hoc networks and their impact on protocol design. CO2. Recognize the classifications and features of different Ad Hoc Routing Protocols. CO3. Analyze the concept of different transport layer and security protocols in Mobile Ad-Hoc Networks. CO4. Acquire the knowledge of different QoS protocols in Mobile Ad-Hoc Networks. CO5. Gain the knowledge of Issues in the wireless Sensor Networks and their solutions.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction

Introduction-Issues–Ad hoc wireless Internet-MAC protocols for Ad hoc wireless networks-Classification of MAC protocols-Contention-Based protocols: MACAW-MACA -Contention-Based protocols with Reservation Mechanisms-D-PRMA–CATA–HRMA-SRMA/PA-Contention-Based protocols with Scheduling Mechanisms: DPS-DWOP.

Ad Hoc Routing Protocols

Introduction-Classifications of Routing Protocols-Table-Driven Routing Protocols–On-Demand Routing Protocols-DSR-AODV-TORA–LAR–ABR–Hybrid Routing Protocols-Implementation of routing protocols using NS2 Simulator.

Transport Layer And Security Protocols For Ad Hoc Wireless Networks

Classification of Transport Layer Solutions-TCP Over Ad Hoc Wireless Networks: Feedback-Based TCP-TCP with Explicit Link Failure Notification-Split TCP-Security in Ad Hoc Wireless Networks-Network Security Requirements-Network Security Attacks-Key Management-Secure Routing in AdHoc Wireless Networks.

Quality Of Service In Ad Hoc Wireless Networks

Introduction–Issues-Classifications of QoS Solutions-MAC Layer Solutions: Cluster TDMA-IEEE 801.11e- Network Layer Solutions–QoSRouting Protocols–Ticket-Based QoS Routing Protocol-PLBQR–TDR-QoS- Frameworks for Ad Hoc WirelessNetworks: QoS Model-QoS Resource reservation signalling-SWAN.

Wireless Sensor Networks

Introduction–Sensor Network Architecture–Data Dissemination-Data Gathering–MAC Protocols for Sensor Networks–Location Discovery–Quality of a Sensor Network.

Total Hours: 45 hours

Text book:

1.	C. Siva Ram Murthy and B.S. Manoj “AdHoc Wireless Networks: Architectures and Protocols”, PearsonEducation 2004,Reprint 2012.
2.	AzzedineBoukerche , “Algorithms and Protocols for Wireless and Mobile Ad Hoc Networks” ,Wiley ,2008.

Reference(s) :

1.	Klaus Wehrle, MesutGünes, James Gross , “Modeling and Tools for Network Simulation”, Springer Berlin Heidelberg, 2010.

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2	Subir Kumar Sarkar, T.G. Basavaraju, C. Puttamadappa ,“Ad Hoc Mobile Wireless Networks Principles, Protocols and Applications” Taylor & Francis, 2007.
3	S.Rjasekaran, G.A.VijayalakshmiPai,” Neural Networks, Fuzzy Logic, and Genetic algorithms”, Prentice Hall PTR, 2005.
4	C.K. Toh, “Ad Hoc Mobile Wireless Networks: Protocols and Sytems”, Prentice Hall PTR, 2010.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2				2		2			2	
2	3	2	3	2						2		2	2	
3	3	2	3	2	2					2			2	
4	3	3	3	2						2			2	
5	3	3	2	2	2					2		2	2	

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K.S. Rangasamy College of Technology – Autonomous R2018								
50 CS E42 – AGILE METHODOLOGY								
Elective – IV								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	2	0	2	45	3	50	50	100

Objective(s)	• To adapt existing testing experience and knowledge to Agile values and principles. • To choose the appropriate agile approaches for a specified application. • To realize the importance of interacting with business stakeholders in determining the requirements for a software system. • To develop the techniques and tools for improving team collaboration and software quality. • To examine their applications in the real world and addresses their impacts on developing software
Course Outcomes	**At the end of the course, the students will be able to** CO1 : Review the knowledge on Techniques and Tools used for Agile Methodology. CO2 : Apply the various Agile Flavors based on the nature of the Project. CO3 : Apply knowledge & recognize the impact of Social Aspects on Software Development Success and Migration to Agile CO4: Recognize the importance of interacting with Business Stakeholders in determining the requirements for a Software System. CO5 : Recognize Software Process improvement as an ongoing Task for Development Teams and how Agile approaches can be scaled up to the Enterprise level.

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

AGILE METHODOLOGY

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model – Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams – Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values. [9]

AGILE PROCESSES

Lean Production – SCRUM, Crystal, Feature Driven Development- Adaptive Software Development – Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices. [9] **AGILITY AND KNOWLEDGE MANAGEMENT**

Agile Information Systems – Agile Decision Making – Earl`S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM), Role and Skill of Tester in Agile Team. [9]

AGILITY AND REQUIREMENTS

Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation. [9] **AGILITY AND QUALITY ASSURANCE**

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance – Test Driven Development – Agile Approach in Global Software Development. [9]

Total Hours: 45 hours

Text book:

1. David J. Anderson and Eli Schragenheim, “Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results”, Prentice Hall, 2003.

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2.	Hazza and Dubinsky, “Agile Software Engineering, Series: Undergraduate Topics in Computer
	Science”, Springer, 2009.
Reference(s) :	
1.	Craig Larman, “Agile and Iterative Development: A Manager_s Guide”, Addison-Wesley, 2004.
2	Kevin C. Desouza, “Agile Information Systems: Conceptualization, Construction, and Management”, Butterworth-Heinemann, 2007

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2									2	3	
2	3	3	3		3				3	2	2	2	3	2
3	3	3	3		3				3	2	2	2	3	
4	3	3	3		3		2					2	3	
5	3	3	3		3		2		3	2	2	2	3	2

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BoS Chairman

K.S. Rangasamy College of Technology – Autonomous R2018								
50 CS E43 - Software Forensics								
Elective – IV								
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
VII	**2**	**0**	**2**	**45**	**3**	**50**	**50**	**100**

Objective(s)	• To learn basic concept of software forensics • To study Player-Hackers, Crackers, Phreaks, and other Doodz, Avanced tools, Law and Ethics-Software forensics in court, Computer Virus and Malware Concepts and Background, Programming Cultures and Indicators, Stylistic Analysis and Linguistic Forensics, Nalysauthorship AIS.
Course Outcomes	At the end of the course, the students will be able to CO1 : Realize basics of Software Forensics technologies and practices CO2 : Comprehend the knowledge on players and various basic software forensics tools CO3 : Comprehend the law and ethics of forensics CO4: Identify various computer viruses and malware and Attain knowledge on programming cultures CO5 : Perform stylistic analysis and linguistic forensics

Introduction To Software Forensics, Software Code and Analysis Tools

Motivations and Rationales - General Characteristics - Black hat Products - Other Products - Summary - The Programming Process Digital Forensic Definitions - Software Forensics - Objectives and Objects of Software Forensics - Identity - Other Object of Study - Software Forensic Tools -The Process - The Products - Finally, Already, the Tools - Software Forensic Technologies and Practices - Content Analysis -Legal Considerations - Presentation in Court [9]

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The Player-Hackers, Crackers, Phreaks, and Other Doodz

Terminology -Types of Black hats -The Products -The Resulting Objects -The Analytical Tools -Forensic Tools [4]

Advanced Tools, Law and Ethics-Software Forensics In Court

Decompilation -Desquirr -Dcc Boomerang -Plagiarism -JPlag -YAP -Other Approaches -summary -Legal Systems - Differences Within Common Law -Jurisdiction -Evidence -Types of Evidence - Rules of Evidence -Providing Expert Testimony -Ethics -Disclosure - Blackhat motivations as a Defense [9]

Computer Virus and Malware Concepts and Background, Programming Cultures and Indicators

History of Computer viruses and Worms -Malware Definition and Structure -Virus Structure -Trojan structure -Logic Bomb Structure -Remote Access Trojan (RAT) Structure -Distributed Denial of Service (DDoS) Structure Detection and Antidetection Techniques -Detection Technologies -tealth and Antidetection Measures -Summary -User Interface -Cultural Features and “Help” -Functions -Programming Style -Program structure -Programmer Skill and Objectives -Developmental Strictures -Technological Change –Summary. [9]

Stylistic Analysis and Linguistic Forensics, Nalysauthorship Ais

Biblical Criticism -Shakespeare and Other Literature -Individual Identification and Authentication -Content Analysis Noncontent Analysis -The Content/Noncontent Debate -Noncontent Metrics as Evidence of Authorship -Additional Indicators - Summary -Problems - Plagiarism Detection Versus Authorship Analysis -How Can It Work? - Source Code Indicators - More General Indicators - Is It Reliable? [9]

Text book:

1. Robert M.Slade ,”Software forensics” , Tata McGraw – Hill Publishing Company Limited, New Delhi,2005.

Reference(s) :

1. Bill Nelson, Amelia Phillips, Christopher Steuart, “Guide to computer forensics and investigations”, Cengage Learning, 2010

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2		3	2	3									3

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2			3			2		3				2	3	
3	2				2	2		3				2		3
4	2	3	3	3	3			2	3					
5	2	3			3	2						3		3

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BoS Chairman

K.S. Rangasamy College of Technology – Autonomous R2018								
50 CS E44 - Multimedia Computing								
Elective – IV								
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
VII	**3**	**0**	**0**	**45**	**3**	**50**	**50**	**100**
Objective(s)	Learning Concepts of Multimedia Tools, Multimedia Operating Systems, Multimedia Communication Systems, Data Compression and Multimedia Applications							
Course Outcomes	CO1: Examine different elements of multimedia system, storage media for multimedia systems and animation CO2: Comprehend multimedia editing tools for audio, video, image and analyse linking multimedia objects CO3: Outline Real-time, process, resource management and examine different Database management system for multimedia CO4: Predict multimedia communication subsystems and generate multimedia synchronization reference model **CO5:** Compare different data compression techniques and gain knowledge about Multimedia application							

Introduction to Multimedia

Elements of multimedia system – Need and aspects of multimedia - Information units. Sound - Audio file formats – MIDI – Images - Computer Image Processing - Principles of animation - Animation techniques - Creating animated scenes – Video - Basic concepts - Video Capture - Recording format - Storage for multimedia - CD Technologies - Multimedia Workstations

Multimedia Tools

Basic tools - Image-editing tool - Painting and drawing tools –Sound editing programs - Video formats - Linking multimedia objects – OLE -presentation tools - authoring tools. **Multimedia Operating Systems**

Introduction - Real Time - Resource Management - Process Management - File Systems - Database Systems - Multimedia Database Management System - Characteristics of an MDBMS - Data Analysis - Data Structure - Operations on Data - Integration in a Database Model

Multimedia Communication Systems

Application Subsystem - Transport Subsystem – Synchronization - Introduction - Notion of Synchronization - Presentation Requirements - A Reference Model for Multimedia Synchronization - Synchronization in distributed environment. **Data Compression and Multimedia Applications**

Source entropy and hybrid coding – JPEG – MPEG - H.261 - DVI. Video conferencing - Tele conferencing – Tele services – messaging services – retrieval services – Tele action services.

Text book:

1	Ralf Steinmetz, Klara Nahrstedt, "Multimedia: Computing, Communications and Applications", Pearson Education Asia, New Delhi, 2002.
2	Tay Vaughan, “Multimedia: Making it work”, sixth edition, Tata McGraw Hill, New Delhi, 2002.

Reference(s) :

1.	Fred Halsall, “Multimedia Communication, Application Networks, Protocols and Standard”, fourth edition, Addison Wesley, New Delhi, 2001.
2.	John F.Koegal Buford, “Multimedia Systems”, Pearson Educational Asia, New Delhi, 2001.
3.	Ron, Goldberg, "Multimedia Producer's Bible", fifth edition, Comdex Computer Publishing, New Delhi, 1996.
4.	Tay Vaughan, “Multimedia: Making it work”, sixth edition, Tata McGraw Hill, New Delhi, 2002.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	2		3				1	3	1	2	2	2
2	2	2	2		3				2	3	2	2	2	2
3	3	2	2		2				2	3	2	2	2	

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4	3	2	2		1				1	3	1	2		
5	3	2	2		1				1	3	1	2		

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BoS Chairman

K.S. Rangasamy College of Technology – Autonomous R2018								
50 CS E45 – Soft Computing								
Elective – IV								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100

Objective(s)	• Provide knowledge on knowledge based systems • Learn the fundamentals of fuzzy logic • Acquire knowledge on artificial neural networks • Know how cooperative neuro-fuzzy systems work • Gain knowledge on the preliminaries of evolutionary computing
Course Outcomes	**At the end of the course, the students will be able to** CO1: Illustrate the key aspects of the knowledge based system and how knowledge is represented and processed CO2: Know the basic concept of fuzzy systems CO3: Illustrate the concept of learning and acquisition of knowledge CO4: Identify the key concepts of Neuro Fuzzy systems CO5: Illustrate the concept of genetic algorithm

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Introduction to Intelligent Systems and Soft Computing

Intelligent Systems – Types of Intelligent Systems - Knowledge Based Systems - Knowledge Representation and Processing – Soft Computing [9]

Fundamentals of Fuzzy Logic Systems

Background - Fuzzy Sets - Fuzzy Logic Operations - Implication - Some Definitions - Fuzziness and Fuzzy Resolution - Fuzzy Relations - Composition and Inference – Projection - Consideration of Fuzzy Decision Making. [9]

Fundamentals of Artificial Neural Networks

Learning and Acquisition of Knowledge - Features of Artificial Neural Networks - Fundamentals of Connectionist Modeling-Major Classes of Neural Networks - Multilayer Perceptron-Radial Basis Function Networks-Kohonen's Self-Organizing Network-The Hopfield Network-Industrial and Commercial Applications of ANN – Introduction to deep learning. [9]

Neuro-Fuzy Systems

Background - Architectures of Neuro Fuzzy Systems - Cooperative Neuro Fuzzy Systems – Neural Network Driven.Fuzzy Reasoning - Hybrid Neuro Fuzzy Systems - Construction of Neuro Fuzzy Systems – Structure Identification Phase - Parameter Learning Phase. [9]

Evolutionary Computing

Overview of Evolutionary Computing - Genetic Algorithms and Optimization - The Schema Theorem – The Fundamental Theorem of Genetic Algorithms - Genetic Algorithm Operators - Integration of Genetic Algorithms with Neural Networks - Integration of Genetic Algorithms with Fuzzy Logic – Known Issues in GAs - Population-Based Incremental Learning - Evolutionary Strategies – ES Applications – Case study on the application of genetic algorithm. [9]

Total Hours: 45 hours

Text book(s):

1. Fakhereddine O Karray and Clarence De Silva, "Soft Computing and Intelligent Systems Design:Theory, Tools and Applications", Pearson, 2009.

Reference(s) :

1. Madan M Gupta and Naresh K Sinha, "Soft Computing and Intelligent Systems: Theory and Applications", Academic Press, 1999
2. S Rajasekaran and G A Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms Synthesis and Applications", Prentice Hall India, 2003.

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3.	S N Sivanandam, S Sumathi and S N Deepa, “Neural Networks using MATLAB”, Tata McGraw-Hill, 2005.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	2	3										2
2	3	3	2	3	1									2
3	3	3	2	1	1			1						3
4	3	3	2	2	1									3
5	3	3	2	1	1				2	2	1	2		2

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50 CS E46 - Professional Readiness for Innovation, Employability and Entrepreneurship

Elective - IV

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	0	0	6	45	3			

Objective(s)

- To empower students with overall Professional and Technical skills required to solve a real world problem.
- To mentor the students to approach a solution through various stages of Ideathon, Research , Design Thinking , workflows , architecture and building a prototype in keeping with the end user and client needs.
- To provide experiential learning to enhance the Entrepreneurship and employability skills of the students.

Course Outcomes

At the end of the course, the students will be able to

CO1: Upskill In emerging technologies and apply to real industry-level use cases
CO2: Understand agile development process
CO3: Develop career readiness competencies, Team Skills/leadership qualities
CO4: Develop Time management, Project management skills and Communication Skills
CO5: Use Critical Thinking for Innovative Problem Solving
CO6: Develop entrepreneurship skills to independently work on products

The course will involve 40-50 hours of technical training, and 40-50 hours of project development. The activities involved in the project along with duration are given in table 1.

Table 1: Activities

Activity Name	Activity Description	Time(Weeks)
Choosing a Project	Selecting projects from the list of projects categorized various technologies & business domains	2
Team Formation	Students shall form a team of 4 members before enrolling to a project. Team members shall distribute the project activities among themselves.	1
Hands on training	Students will be provided with hands-on training on selected technology in which they are going to develop the project.	2

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Project Development	Project shall be developed in agile mode. The status of the project shall be updated to the mentors via appropriate platform.	6
Code submission, project Doc and Demo	Project deliverable must include the working code, project document and demonstration video. All the	3
	project deliverables are to be uploaded to cloud based repository such as GitHub.	
Mentor review and Approval	Mentor will be reviewing the project deliverable as per the milestone schedule and the feedback will be provided to the team.	1
Evaluation and Scoring	Evaluators will be assigned to the team to evaluate the project deliverable, and the scoring will be provided based on the evaluation metrics	1
Total		16 weeks

ly, it involves 15 weeks of learning and doing, and one week for evaluation. The evaluation will be ca
technical and soft skills as given in table 2.

Table 2: Evaluation Schema

	Skills		Weightage
I	Technical Skills		
	1	Technical Training & Assignments	20%
	2	Project Planning	5%
	3	Requirements Analysis	5%
	4	Project Design	5%
	5	Innovation	5%
	6	Technology Stack (Utillization of various APIs, tools, techniques)	5%
	7	Coding	15%
	8	Acceptance Testing	5%
	9	Performance	5%
II	Soft Skills		
	1	Team work	5%
	2	Time management	10%
	3	Attendance & Punctuality	5%
	4	Project Documentation	5%
	5	Project Demonstration	5%
Total Scores			100%

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50 CS E51 - Machine Learning								
Elective – V								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	2	0	2	45	3	50	50	100

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Objective(s)	1. To understand the basic concepts of machine learning 2. To have a thorough understanding of the Tree learning learning and Neural Networks 3. To learn the theoretical aspects of Bayesian Learning 4. To understand the principles of instance based learning and Cluster Analysis 5. To have a thorough understanding of the Learning sets of rules
Course Outcomes	**At the end of the course, the students will be able to** CO1: identify the perspectives of machine learning CO2: apply decision tree and Artificial neural networks for real world problems CO3: design a Bayesian classifier for solving a problem CO4: illustrate the principles of instance based learning and Cluster Analysis CO5: describe the algorithms for rule and reinforcement learning

Introduction: Learning Problems - Designing a Learning System - Perspectives and Issues in Machine Learning – Concept Learning – task – search – finding maximally specific Hypotheses – version spaces and candidate elimination algorithm-inductive bias [9]

Decision Tree Learning and Artificial Neural Networks: Decision Tree Representation – Problems – basic decision tree learning algorithms – hypotheses search – Issues – Artificial Neural Networks: Introduction – Representations – Problems – Perceptrons – Multilayer networks and Back Propagation Algorithm – example. [9]

Bayesian Learning: Bayes Theorem – Concept Learning – Maximum Likelihood and Least-Squared Error Hypothesis - Maximum Likelihood Hypotheses for Predicting Probabilities - Bayes Optimal Classifier - Gibbs Algorithm - Naïve Bayes Classifier – Example. [9]

Instance Based Learning and Cluster Analysis: Introduction – k-Nearest Neighbour Learning – Locally Weighted Regression - Radial Basis Functions - Case-Based Reasoning. Cluster Analysis- Introduction - Types - A Categorization of Major clustering methods -partitioning methods - Hierarchical methods - Density-Based Methods. [9]

Learning Sets of Rules: Learning sets of rules: Introduction – sequential covering algorithms – Learning Rule Sets- First order rules – FOIL – Induction as Inverted deduction – inverting resolution – **Rough Set Theory: Concepts-of rough sets-Feature selection and rule induction-Theory and its applications -** Reinforcement learning – Introduction – Learning task – Q learning-Nondeterministic Rewards and Action, Temporal Difference Learning-Generalizing from Examples. [9]

Total Hours: 45 hours

Text Book(s):

1. Tom M. Mitchell, —Machine Learning, Indian Edition, McGraw-Hill Education (India), 2013.
2. D. Barber, “Bayesian Reasoning and Machine Learning”, Cambridge University Press,2012

Reference(s) :

1. Simon Rogeres and Mark Girolami, —A First Course in Machine Learning‖, CRC Press, 2015
2. EthemAlpaydin, —Introduction to Machine Learning‖, 3rd Edition, Prentice Hall India, 2015.
3. Jiawei Han and MichelineKamber, “Data Mining Concepts and Techniques”, 3 rd Edition, 2011 Morgan Kaufman Publications.
4. K. P. Murphy, “Machine Learning: A probabilistic perspective”, MIT Press, 2012.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3										3		3
2	3	3	3	2	2	2	2		3	3	2	3	2	3
3	3	3	3	2	2				3	3	2	3	2	3

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4	3	3	3	2	2	2	2		3	3	2	3	2	3
5	3	3										3		3

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50 CS E52 – Foundations of Block Chain Technology								
Elective – V								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	2	0	2	45	3	50	50	100

Objective(s)	• Understand the basic concepts of Distributed systems and Cryptography • Understand emerging abstract models for Block chain Technology. • Identify the challenges and technical gaps existing between theory and practice in cryptocurrency domain • Design, build, and deploy smart contracts and distributed applications. • Develop Block chain based applications and games
Course Outcomes	**At the end of the course, the students will be able to** CO1:Explore the basic concepts of Distributed database, Cryptography algorithms and functions. CO2: Interpret the design principles of Blockchain and Mining concepts. CO3: Investigate the techniques of distributed consensus. CO4: Recognize the concepts of cryptocurrency and learn Ethereum development CO5:Design and develop projects, smart contracts using Block-chain technology

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Basics

Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete.

Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

[9]

Blockchain

Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain. Blockchain Technology for IoT Applications [9]

Distributed Consensus

Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

[8]

Cryptocurrency

History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, Truffle -Design and issue Crypto currency, Mining, DApps, GHOST, Vulnerability, Attacks, Sidechain, Namecoin. [9]

Cryptocurrency Regulation and Applications

Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market andGlobal Economy.

Applications: Internet of Things, E-Governance, Land Registration, Medical Record Management System, Domain Name Service and future of Blockchain-Naive Blockchain construction - Hashcash implementation, Smart Contract Construction, AWS Blockchain Templates.

[10]

Text Book:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction”, Princeton University Press (July 19, 2016).

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2.	Andreas M. Antonopoulos, “Mastering Ethereum : Programming the open Blockchain”,Oreilly
Reference(s) :	
1.	Andreas M. Antonopoulos, “Mastering Bitcoin: Unlocking Digital Cryptocurrencies”,Oreilly.
2.	DR. Gavin Wood, “ETHEREUM: A Secure Decentralized Transaction Ledger”, Yellow paper,2014.
3.	Kedarlyer & Chris Dannen “Building games with Ethereum smart contracts: intermediate projects for Solidity developers”,Apress,2018.
4.	Andreas M. Antonopoulos,”MasteringEthereum: Building Smart Contracts and DApps”, Oreilly.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2				3		2				
2	3	2	3	2						2		2		
3	3	2	3	2	2					2				
4	3	3	3	2						2				
5	3	3	2	2	2					2		2		

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50 CS E53 –Text Mining								
Elective – V								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	2	0	2	45	3	50	50	100

Objective(s)	1. To understand the basic issues and types of text mining 2. To appreciate the different aspects of text extraction and clustering 3. To understand classification techniques of text 4. To know in detail about text streams 5. To appreciate the current trends in text mining
Course Outcomes	**At the end of the course, the students will be able to** CO1: Identify the different features that can be mined from text and web documents and appraise the knowledge of trees with its operations CO2: Apply the concept of Text Extraction and Clustering CO3: Review various Classification Techniques CO4: Appraise the knowledge in text streams CO5: Practice visualization methodologies using tools

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

INTRODUCTION

Overview of text mining-Definition-General Architecture–Pre-processing–Types of Problems- Collecting documents-document standardization-tokenization-lemmatization-vector generation for prediction-sentence boundary determination -evaluation performance [8]

TEXT EXTRACTION AND CLUSTERING

Text Extraction: Introduction, Rapid automatic keyword extraction: candidate keywords, keyword scores, adjoining keywords, extracted keywords, Benchmark evaluation: precision and recall, efficiency, stoplist generation, Evaluation on new articles.
Clustering: Multilingual document clustering: Multilingual LSA, Tucker1 method, PARAFAC2 method. [10]

CLASSIFICATION

Content-based spam email classification using machine-learning algorithms, Utilizing nonnegative matrix factorization for email classification problems, Constrained clustering with k-means type algorithms. [8]

TEXT STREAMS

Introduction, Text streams, Feature extraction and data reduction, Event detection, Trend detection, Event and trend descriptions, Embedding semantics in LDA topic models: Introduction, vector space modeling, latent semantic analysis, probabilistic latent semantic analysis, Latent Dirichlet allocation, embedding external semantics from Wikipedia, data-driven semantic embedding. [10]

RECENT TRENDS

Visualization Approaches -Architectural Considerations -Visualization Techniques in Link Analysis -Example-Mining Text Streams -Text Mining in Multimedia -Text Analytics in Social Media -Opinion Mining and Sentiment Analysis -Document Sentiment Classification -Opinion Lexicon Expansion -Aspect-Based Sentiment Analysis -Opinion Spam Detection –Text Mining Applications and Case studies(Vector Representations of Words - Word Embeddings for the digital humanities)-Implementing Recommender System in Python [9]

Total Hours: 45 hours

Text book:

1. Michael W. Berry & Jacob Kogan ,"Text Mining Applications and Theory", Wiley publications.

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2.	Ashok N. Srivastava,Mehran Sahami, “Text Mining: Classification, Clustering, and Applications”,CRC
	Press
3.	Sholom Weiss, Nitin Indurkhya, Tong Zhang, Fred Damerau“The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data”, Springer, paperback 2010
Reference(s) :	
1.	Aggarwal, Charu C., and ChengXiang Zhai, eds. Mining text data. Springer Science & Business Media, 2012.
2	Behrouz Zolfaghari, Khodakhast Bibak , Takeshi Koshiba , Hamid R. Nemati, Pinaki Mitra , “Statistical Trend Analysis of Physically Unclonable Functions: An Approach via Text Mining, CRC Press”; 1st edition (March 26, 2021)
3	Charu C. Aggarwal,ChengXiang Zhai,Mining Text Data, Springer; 2012
4	Miner, Gary, et al. Practical text mining and statistical analysis for non-structured text data applications. Academic Press, 2012.

CO’s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	2	2	2							2		3
2	2	3	3	3	3							2	2	3
3	2	3	3	2	3							2	2	3
4	2	3	2	2	3						2	2	2	3
5	2	3	3	2	3	2		2	2	2	2	3	2	3

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50 CS E54 - Cyber Security

Elective – V

Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	2	0	2	45	3	50	50	100

Objective(s)	• To understand the basic concepts and challenges in cyber security • To impart the knowledge on modern tools to resolve the security issues • To provide an ability to use basic security tools to enhance system security and can develop basic security enhancements in stand-alone applications.
Course Outcomes	**At the end of the course, the student will be able to** CO1: Recognize the concept of cybercrime in mobile devices CO2: Enumerate the cyber security challenges in the modern devices. CO3: Analyze the working principle of cyber security tools and methods CO4: Understand the state of the art of Mobile platform security models CO5: Evaluate the various testing strategies in Mobile Security

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

INTRODUCTION TO CYBERCRIME

Cybercrime- definition and origins of the world- Cybercrime and information security Classifications [9] of cybercrime- Cybercrime and the Indian ITA 2000 - A Global Perspective on cybercrimes- Cloud Computing-Proliferation of Mobile and Wireless Devices- Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era.

CYBER SECURITY CHALLENGES IN MODERN DEVICES

Security Challenges Posed by Mobile Devices- Registry Settings for Mobile Devices Authentication [9] Service Security- Attacks on Mobile/Cell Phones, Mobile Devices, - Security Implications for Organizations- Organizational Measures for Handling Mobile-Devices-Related Security Issues Organizational Security Policies and Measures in Mobile Computing Era,Laptops.

TOOLS AND METHODS [9]

Tools and Methods Used in Cyber line Proxy Servers and Anonymizers- Phishing -Password Cracking, Key loggers and Spywares, - Virus and Worms, Steganography - DoSDDoS Attacks - SQL Injection, Buffer Over Flow - Attacks on Wireless Networks, Phishing, Identity Theft (ID Theft) - The Legal Perspectives - Cyberlaw: The Indian Context - The Indian IT Act, Introduction to Security Audit.

Mobile platform security models [9]

Android – iOSMobile platform security models – Detecting Android malware in Android markets

Mobile Security Testing

Mobile platform internals – Security testing in the mobile app development lifecycle – Basic static and dynamic security testing – Mobile app reverse engineering and tampering– Assessing software protections

Total Hours

45

Text books :

1.	Nina Godbole, SunitBelapure, Cyber Security, Wiley India, New Delhi 2012.
2.	Harish Chander, cyber laws & IT protection, PHI learning pvt.ltd, 2012.

Reference Books:

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1.	Dhiren R Patel, Information security theory &practice,PHI learning pvt ltd,2010
2.	MS.M.K.Geetha&Ms.SwapneRaman Cyber Crimes and Fraud Management, MACMILLAN,2012.
3.	Mayank Bhusan, Rajkumar Singh Rathore, AatifJamshed,Fundamental of Cyber Security: Principles, Theory and Practices",BPB Publishers, Delhi,2017.
4.	William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition, 2010.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3			2	2		2				2		
2	2	3			2	2		2				2		
3	2	3			2	2		2				2		
4		2			2	2						2		
5		2			2	2						2		

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50 CS E55 – Social Network Analysis

Elective – V

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	50	50	100

Objective(s)	• To understand the concept of social network data and graphs to represent social relations. • To gain the knowledge of social influence and its structure representation. • To understand the information networks in social web and related applications. • To describe the trust network analysis. • To use software to simulate the dynamics of networks.
Course outcomes	**At the end of the course, the students will be able to:** CO1:Explore Social network data and social relations. CO2:Model social network data and understand its logical relationships. CO3:Analyze complex network structure of web for information retrieval. CO4:Mine the behavior of the users in the social networks. CO5:Simulate the dynamics of networks based on social network models..

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INTRODUCTION **[8]**

Social network data-Formal methods- Paths and Connectivity-Graphs to represent social relations-Working with network data- Network Datasets-Strong and weak ties - Closure, Structural.

SOCIAL INFLUENCE **[9]**

Homophily- Mechanisms Underlying Homophily, Selection and Social Influence, Affiliation, Tracking Link Formation in On-Line Data, Spatial Model of Segregation - Positive and Negative Relationships - Structural Balance - Applications of Structural Balance, Weaker Form of Structural Balance..

INFORMATION NETWORKS AND THE WORLDWIDE WEB **[10]**

The Structure of the Web- World Wide Web- Information Networks, Hypertext, and Associative Memory- Web as a DirectedGraph,Bow-Tie Structure of the Web- Link Analysis and Web Search Searching theWeb: Ranking, Link Analysis using Hubs and Authorities- Page Rank- Link Analysis in Modern Web Search, Applications, Spectral Analysis, Random Walks, and Web Search..

SOCIALNETWORK MINING **[9]**

Clustering of Social Network graphs: Betweenness, Girvan Newman Algorithm-Discovery of communities- Cliques and Bipartite Graphs-Graph Partitioning Methods-Matrices-Eigen values Sim-rank.

NETWORK DYNAMICS **[9]**

Cascading Behaviour in Networks: Diffusion in Networks, Modelling Diffusion - Cascades and Cluster, Thresholds, Extensions of the Basic Cascade Model- Six Degrees of Separation-Structure and Randomness, Decentralized SearchEmpirical Analysis and Generalized Models- Analysis of Decentralized Search..

Text book

1. Easley and Kleinberg, Networks, Crowds, and Markets: Reasoning about a highly connected world, Cambridge Univ. Press, 2010
2. Robert A.Hanneman and Mark Riddle, Introduction to social network methods,University of California, 2005.
3. Jure Leskovec, AnandRajaraman, Milliway Labs, Jeffrey D. Ullman, Mining of Massive Datasets, Cambridge University Press, Second Edition, 2014.

Reference(s):

1. Wasserman, S., & Faust, K, Social Network Analysis: Methods and Applications, Cambridge University Press; First Edition, 1994.
2. Borgatti, S. P., Everett, M. G., & Johnson, J. C., Analyzing social networks, SAGE Publications Ltd; First Edition, 2013.
3. John Scott, Social Network Analysis: A Handbook, SAGE Publications Ltd; Second Edition, 2000.

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2		2				2	2		2		3
2	3	3	3		3	2		2	2	2		2	2	3
3	3	3	3	3	3	2		2	2	2		2	2	3
4	3	3	2	2	3	3		2	2	2		2	2	3
5	3	3	3		3				2	2		3	2	3

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