



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



**Approved by AICTE, Recognized by UGC & Affiliated to Anna
University Accredited by NBA-AICTE, NAAC-UGC with 'A+'
Grade**

Saravanampatti , Coimbatore -641035

CURRICULUM AND SYLLABUS

REGULATION 2019

CHOICE BASED CREDIT SYSTEM

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.E – COMPUTER SCIENCE AND ENGINEERING

VISION

To evolve as a center of excellence in the field of Computer Science and Engineering for developing technically competent professionals with ethical values to serve the needs of industry and society.

MISSION

- To equip the graduates with advanced problem solving and reflective thinking skills by offering contemporary educational experience.
- To enrich the technical knowledge of the students in diversified areas of Computer Science and Engineering by adopting student-centric & activity- based learning and outcome-based education with state of the art equipment.
- To imbibe new knowledge with technical transformations by collaborating with Industry, Government bodies, R&D Organizations and Foreign Universities.
- To produce high-quality Computer Science and Engineering professionals adapt to change the technological environment with all-round leadership qualities, team spirit and entrepreneur skill set.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Graduates will apply the principles of mathematics, computer science and scientific investigation to solve real world problems in Information Technology Industry and for pursuing higher education.

PEO2: Graduates will apply current industry accepted computing practices with new emerging technologies and modern engineering tools to analyze, design, implement and verify high quality computer-based solutions for real world problems.

PEO3: Graduates will be leaders and managers by effectively communicating at both technical and interpersonal levels.

PEO4: Graduates will apply appropriate knowledge of societal impacts of computing technologies ethically in the course of career related activities for the profession, nation and society.

PEO5: Graduates will be successfully employed for pursuing a lifelong learning by applying basic principles and practices of computing to make software projects successfully which meet the objectives of the research.

PROGRAMME OUTCOMES (POs)

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.

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

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

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

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

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

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

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

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

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Rudiments of Computer Science: Ability to understand, analyze the theoretical foundations of Computer science and apply problem solving methodologies, programming techniques and tools to solve the real-world issues.

PSO2: Software fundamentals and its development: Ability to understand an apparent picture of software development life cycle and acquire the programming skills under various platforms for successful implementation of automation systems.

PSO3: Research Ability and Entrepreneurship: Ability to use the Knowledge in multiple domains to identify the research gap in the real-world environment, hence this provides an obvious line of attack to innovate new ideas and helps to become a successful entrepreneur.



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COIMBATORE-35
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



R 2019
SUGGESTED CURRICULUM AND SYLLABI

B.E – COMPUTER SCIENCE & ENGINEERING

Description / Semester	AICTE	SNSCT - CSE Suggested	Sem 1	Sem 2	Sem 3	Sem 4	Sem 5	Sem 6	Sem 7	Sem 8
Humanities, Social Sciences and Management Courses(HSMC)	12	21	3	2	4	4	4	2	2	
Basic Science Courses (BSC)	25	27	8	8	3	3	3		2	
Engineering Science Courses (ESC)	24	27	7	13	4	3				
Professional Core Courses (PCC)	48	50			12	14	15	9		
Professional Elective Courses (PEC)	18	12					3	6	3	
Open Elective Courses (OEC)	18	8						3	3	2
Project/Seminar/Internship(E EC)	15	24	3	1	1	2	1	2	2	12
Mandatory Courses (MC)	Non Credit									
TOTAL	160	169	21	24	24	26	26	22	12	14

SEMESTER I										
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category
Theory Courses										
1.	19MAT101	Linear Algebra & Calculus	3	1	0	0	4	4	50/50	BSC
2.	19CST101	Programming for Problem Solving	3	0	0	0	3	3	50/50	ESC
3.	19GET102	Basic Civil and Mechanical Engineering	3	0	0	0	3	3	50/50	ESC
Theory Integrated Practical Courses										
4.	19PYB102	Physics of Material and Photonics	3	0	2	0	5	4	60/40	BSC
5.	19ENB101	Communicative English	2	0	2	0	4	3	60/40	HSMC
6.	19GEB101	Design Thinking and Innovation	1	0	0	4	5	3	100/0	EEC
Practical Courses										
7.	19CSP101	Programming for Problem Solving Laboratory	0	0	2	0	2	1	60/40	ESC
Mandatory Course										
8.	19HST101	Induction Program	3 weeks					0	-	MC
9.	19HST102	Environmental Science	2	0	0	0	2	0	100/0	MC
	Total		17	1	6	4	28	21		

SEMESTER II										
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category
Theory Courses										
1.	19CST102	Object Oriented Programming	3	0	0	0	3	3	50/50	ESC
2.	19EET103	Electric Circuits and Electron Devices	3	0	0	0	3	3	50/50	ESC
Theory Integrated Practical Courses										
3.	19MAB102	Integral Calculus & Laplace Transforms	3	0	2	0	5	4	60/40	BSC
4.	19CHB103	Engineering Chemistry	3	0	2	0	5	4	60/40	BSC
5.	19MEB103	Engineering Graphics	1	0	4	0	5	3	60/40	ESC

Practical Courses										
6.	19ENP101	Professional Communication	0	0	4	0	4	2	60/40	HSMC
7.	19GEP101	Workshop Practices Laboratory	0	0	4	0	4	2	60/40	ESC
8.	19CSP102	Object Oriented Programming Lab	0	0	4	0	4	2	60/40	ESC
9.	19CSP103	Mini Project –I	0	0	0	2	2	1	100/0	EEC
Mandatory Course										
10.	19HST103	Indian constitution	2	0	0	0	2	0	100/0	MC
	Total		15	0	20	2	37	24		

SEMESTER III											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1.	19MAT201	Transforms and Partial Differential Equations	3	0	0	0	3	3	50/50	BSC	19MAT101 19MAB102
2.	19CST201	Agile Software Engineering	3	0	0	0	3	3	50/50	PCC	
3.	19ITT201	Data Structures	3	0	0	0	3	3	50/50	PCC	19CST101
4.	19ITT202	Computer Organization and Architecture	3	0	0	0	3	3	50/50	PCC	
5.	19GET275	VQAR-I	2	0	0	0	2	2	50/50	HSMC	19ENB101 19ENP101
Theory Integrated Practical Courses											
6.	19ECB231	Digital Electronics	3	0	2	0	5	4	60/40	ESC	
Practical Courses											
7.	19ITP201	Data Structures Laboratory	0	0	2	0	2	1	60/40	PCC	19CSP101
8.	19ITP202	Python Programming	0	0	4	0	4	2	60/40	PCC	19CSP101
9.	19CSP201	Mini Project-II	0	0	0	2	2	1	100/0	EEC	
10.	19GEP275	Personality Development	1	0	2	0	3	2	60/40	HSMC	19ENB101 19ENP101
	Total		18	0	10	2	30	24			

SEMESTER IV											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1.	19MAT204	Probability and Statistics	3	0	0	0	3	3	50/50	BSC	19MAT201
2.	19CST202	Database Management Systems	3	0	0	0	3	3	50/50	PCC	19ITT201
3.	19CST203	Data Analytics	2	0	0	0	2	2	50/50	PCC	
4.	19ECT221	Microprocessors and Microcontrollers	3	0	0	0	3	3	50/50	ESC	19ECB231
5.	19GET276	VQAR -II	2	0	0	0	2	2	50/50	HSMC	19GET275
Theory Integrated Practical Courses											
6.	19CSB201	Operating Systems	3	0	2	0	5	4	60/40	PCC	19ITT202
7.	19ITB201	Design and Analysis of Algorithms	3	0	2	0	5	4	60/40	PCC	19ITT201
8.		Language Elective	1	0	2	0	3	2	60/40	HSMC	
Practical Courses											
9.	19CSP202	Database Management Systems Laboratory	0	0	2	0	2	1	60/40	PCC	19ITT201
10.	19CSP203	Internship - I	2 Weeks					2	100/0	EEC	
	Total		20	0	8	0	28	26			

SEMESTER V											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1.	19MAT301	Discrete Mathematics	3	0	0	0	3	3	50/50	BSC	19MAT201
2.	19ITT302	Internet of Things(offered by Infosys)	3	0	0	0	3	3	50/50	PCC	
3.	19CST301	Introduction to Machine Learning	2	0	0	0	2	2	50/50	PCC	19CST203
4.		Professional Elective – I	3	0	0	0	3	3	50/50	PEC	
5.		Career Course – I & II						4		HSMC	
Theory Integrated Practical Courses											
6.	19CSB301	Automata Theory and	3	0	2	0	5	4	60/40	PCC	

		Compiler Design									
7.	19CSB302	Computer Networks	3	0	2	0	5	4	60/40	PCC	
Practical Courses											
8.	19CSP301	R Programming	0	0	4	0	4	2	60/40	PCC	19ITP202
9.	19CSP302	Mini Project-III	0	0	0	2	2	1	100/0	EEC	19CST201
	Total		17	0	8	2	27	26			

SEMESTER VI											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1.	19CST302	Neural Networks and Deep learning	3	0	0	0	3	3	50/50	PCC	19CST301
2.		Professional Elective - II	3	0	0	0	3	3	50/50	PEC	
3.		Professional Elective - III	3	0	0	0	3	3	50/50	PEC	
4.		Open Elective – I	3	0	0	0	3	3	50/50	OEC	
5.		Career Course – III						2		HSMC	
Theory Integrated Practical Courses											
6.	19CSB303	Composing Mobile Apps	3	0	2	0	3	4	60/40	PCC	19CST201
Practical Courses											
7.	19ITP303	Full Stack Development	0	0	4	0	4	2	60/40	PCC	
8.	19CSP304	Internship - II	2 Weeks					2	100/0	EEC	19CSP203
Mandatory Course											
9.	19HST105	Essence of Indian Traditional Knowledge	2	0	0	0	2	0	100/0	MC	
	Total		17 0	0	6	0	21	22			

SEMESTER VII											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1.		Professional Elective – IV	3	0	0	0	3	3	50/50	PEC	
2.		Open Elective – II	3	0	0	0	3	3	50/50	OEC	
3.	19GET201	Professional Ethics and Human Values	2	0	0	0	2	2	50/50	HSMC	
4.	19GET277	Biology for Engineers	2	0	0	0	2	2	50/50	BSC	
Practical courses											
5.	19CSP401	Project – I	0	0	0	4	4	2	60/40	EEC	19CSP302
	Total		10	0	0	4	14	12	500		

SEMESTER VIII											
S No.	Course Code	Course Name	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category	PRE-REQUISITES
Theory Courses											
1.		Open Elective (NPTEL Course)						2	-	OEC	
Practical courses											
2.	19CSP402	Project - II	0	0	0	24	24	12	60/40	EEC	19CSP401
	Total		0	0	0	24	24	14			

Items	Credit
1 Hr. Lecture (L) per week	1
1 Hr. Tutorial (T) per week	1
1 Hr. Practical (P) per week	0.5
1 Hr. Field Work/ Project (J) per week	0.5

Humanities, Social Science and Management Courses

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19ENB101	Communicative English	2	0	2	0	3	I
2.	19ENP101	Professional Communication	0	0	4	0	2	II
3.	19GEP275	Personality Development (Team work Emotional Skill, Body language Engineering careers Leadership skills)	2	0	0	0	2	III
4.	19GET275	VQAR -I	2	0	0	0	2	III
5.	19GET276	VQAR -II	2	0	0	0	2	IV
6.	19GEB202	Hindi	1	0	2	0	2	IV
7.	19GEB203	Japanese						IV
8.	19GEB204	German						IV
9.	19GEB205	French						IV
10.		Career Course- I & II	0	0	0	0	4	V
11.		Career Course – III	0	0	0	0	2	VI
12.	19GET201	Professional Ethics and Human Values	2	0	0	0	2	VII
TOTAL							21	

Basic Science Courses

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19PYB102	Physics of Material and Photonics	3	0	2	0	4	I
2.	19MAT101	Linear Algebra and Calculus	3	1	0	0	4	I
3.	19CHB103	Engineering Chemistry	3	0	2	0	4	II
4.	19MAB102	Integral Calculus and Laplace Transforms	3	0	2	0	4	II
5.	19MAT201	Transforms and partial Differential Equations	3	0	0	0	3	III
6.	19MAT204	Probability and Statistics	3	0	0	0	3	IV
7.	19MAT301	Discrete Mathematics	3	0	0	0	3	V
8.	19GET277	Biology for Engineers	2	0	0	0	2	VII
TOTAL							27	

Engineering Science Courses

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19GET102	Basic Civil and Mechanical Engineering	3	0	0	0	3	I
2.	19CST101	Programming for Problem Solving	3	0	0	0	3	I
3.	19CSP101	Programming for Problem Solving Laboratory	0	0	2	0	1	I
4.	19CST102	Object Oriented Programming	3	0	0	0	3	II
5.	19CSP102	Object Oriented Programming Lab	0	0	4	0	2	II
6.	19GEP101	Workshop Practices Laboratory	0	0	4	0	2	II
7.	19MEB103	Engineering Graphics	1	0	4	0	3	II

8.	19EET103	Electric Circuits and Electron Devices	3	0	0	0	3	II
9.	19ECB231	Digital Electronics	3	0	2	0	4	III
10.	19ECT221	Microprocessors and Microcontrollers	3	0	0	0	3	IV
TOTAL							27	

Professional Core Courses

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19CST201	Agile Software Engineering	3	0	0	0	3	III
2.	19ITT202	Computer Organization and Architecture	3	0	0	0	3	III
3.	19ITT201	Data Structures	3	0	0	0	3	III
4.	19ITP201	Data Structures Laboratory	0	0	2	0	1	III
5.	19ITP202	Python Programming	0	0	4	0	2	III
6.	19CST203	Data Analytics	2	0	0	0	2	IV
7.	19CST202	Database Management Systems	3	0	0	0	3	IV
8.	19CSB201	Operating Systems	3	0	2	0	4	IV
9.	19ITB201	Design and Analysis of Algorithms	3	0	2	0	4	IV
10.	19CSP202	Database Management Systems Laboratory	0	0	2	0	1	IV
11.	19ITT302	Internet of Things	3	0	0	0	3	V
12.	19CST301	Introduction to Machine Learning	2	0	0	0	2	V
13.	19CSB301	Automata Theory and Compiler Design	3	0	2	0	4	V
14.	19CSB302	Computer Networks	3	0	2	0	4	V

15.	19CSP301	R Programming	0	0	4	0	2	V
16.	19CST302	Neural Networks and Deep Learning	3	0	0	0	3	VI
17.	19CSB303	Composing Mobile Apps	3	0	2	0	4	VI
18.	19ITP303	Full Stack Development	0	0	4	0	2	VI
		TOTAL					50	

Professional Elective Courses

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.		Professional Elective – I	3	0	0	0	3	V
2.		Professional Elective – II	3	0	0	0	3	VI
3.		Professional Elective – III	3	0	0	0	3	VII
4.		Professional Elective – IV	3	0	0	0	3	VII
		TOTAL					12	

Professional Elective - I

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19CSE301	Introduction to Data Science	3	0	0	0	3	V
2.	19ITT301/ 19CSE302	Data Mining and Warehousing	3	0	0	0	3	V
3.	19CSE303	Artificial Intelligence	3	0	0	0	3	V
4.	19CSE304	Cyber Security	3	0	0	0	3	V
5.	19CSE305	Social Network Analysis	3	0	0	0	3	V

Professional Elective - II

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19CSE306	GPU Architecture and Programming	3	0	0	0	3	VI
2.	19CSE307	Adhoc and Sensor Networks	3	0	0	0	3	VI
3.	19CSE308	Computer Graphics and Visualization	3	0	0	0	3	VI
4.	19CSE309	Digital marketing and its Tools	3	0	0	0	3	VI
5.	19CSE310	Grid and Cloud Computing	3	0	0	0	3	VI

Professional Elective - III

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19CSE311	Data Visualization	2	0	2	0	3	VI
2.	19CSE312	Data, Text and Web Mining	2	0	2	0	3	VI
3.	19CSE313	Optimization Techniques	2	0	2	0	3	VI
4.	19CSE314	Open Source Software	2	0	2	0	3	VI
5.	19CSE315	UI/UX Design	2	0	2	0	3	VI

Professional Elective - IV

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19MEE301	Engineering Economics and Cost Analysis	3	0	0	0	3	VII
2.	19CSE401	Software Project Management	3	0	0	0	3	VII
3.	19CSE402	Virtual Reality and Digital Entertainment	3	0	0	0	3	VII
4.	19ITE305	Big Data Analytics(Offered by Infosys)	3	0	0	0	3	VII
5.	19CSE403	Green Cloud Computing	3	0	0	0	3	VII

Open Elective Courses

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.		Open Elective – I	3	0	0	0	3	VI
2.		Open Elective – II	3	0	0	0	3	VII
		TOTAL					6	

Open Elective Courses offered to Other Programmes

S.No	Course Code	COURSES OFFERED	L	T	P	J	C
1.	19CSO301	Android Application Development	3	0	0	0	3
2.	19CSO302	Introduction to Data Analytics	3	0	0	0	3
3.	19CSO303	Web Designing	3	0	0	0	3
4.	19CSO304	Cyber Law and Ethics	3	0	0	0	3
5.	19CSO401	Fundamentals of AR / VR	3	0	0	0	3
6.	19CSO402	Principles of Machine Learning and Automation	3	0	0	0	3
7.	19CSO403	Principles of Artificial Intelligence	3	0	0	0	3
8.	19CSO404	Fundamentals of Digital Marketing	3	0	0	0	3
9.	19CSO405	Introduction to Internet of Things	3	0	0	0	3
10.		Latest Technology Courses offered through NPTEL	0	0	0	0	2

Employability Enhancement Courses [EEC]

S.No	Course Code	Courses Offered	L	T	P	J	C	Sem
1.	19GEB101	Design Thinking and Innovation	1	0	0	2	3	I
2.	19CSP103	Mini Project-I	0	0	0	2	1	II
3.	19CSP201	Mini Project-II	0	0	0	2	1	III
4.	19CSP203	Internship I	2 Weeks				2	IV
5.	19CSP302	Mini Project-III	0	0	0	2	1	V
6.	19CSP304	Internship II	2 Weeks				2	VI
7.	19CSP401	Project – I	0	0	0	4	2	VII
8.	19CSP402	Project– II	0	0	0	24	12	VIII
		TOTAL					24	

Career Courses

S No.	Track	Course Code	Course	L	T	P	J	Contact hrs/week	Credit	Int/Ext	Category
Theory Courses											
1.	Track 1 Job (6 Credits)	19GEP375	Technical Interviewing	0	0	4	0	4	2		HSMC
2.		19GEB375	Personnel Psychology	1	0	2	0	3	2		HSMC
3.		19GEB379	Employable Skill Development	1	0	2	0	3	2		HSMC
4.	Track 2 Entrepreneurship (6 Credits)	19GEB376	Entrepreneurship & Business Model Canvas	2	0	4	0	6	4		HSMC
5.		19GET376	Economics, Finance & Accounting	1	0	0	0	1	1		HSMC
6.		19GET377	Intellectual Property Rights	1	0	0	0	1	1		HSMC
7.	Track 3 Higher Education (6 Credits)	19GEB377	Advanced Verbal Quantitative Aptitude & Reasoning	2	0	2	0	4	3		HSMC
8.		19GET375	Networking	1	0	0	0	1	1		HSMC
9.		19GEB380	Higher Studies in Abroad & India	1	0	2	0	3	2		HSMC
10.	Track 4 Govt. /RRB/ Bank (6 credits)	19GEB378	Foundation Course on Competitive Exams	2	0	4	0	6	4		HSMC
11.		19GEB381	Personnel Psychology for Govt Job	1	0	2	0	3	2		HSMC

Mandatory Non-Credit Courses

S.No	Course Code	COURSES OFFERED	L	T	P	J	C	Sem
1.	19HST101	Induction Program	3 Weeks				0	I
2.	19HST102	Environmental Science	2	0	0	0	0	I
3.	19HST103	Indian Constitution	2	0	0	0	0	II
4.	19HST105	Essence of Indian Traditional Knowledge	2	0	0	0	0	VII

ONE CREDIT COURSES

S.No	Course Code	Courses Offered
1.	19CSOC1	Arduino Programming
2.	19CSOC2	Build Native Mobile Apps with Flutter
3.	19CSOC3	Raspberry Pi using PyCharm

SEMESTER	I	II	III	IV	V	VI	VII	VIII	TOTAL
CREDITS	21	24	24	26	26	22	12	14	169

SEMESTER I

19MAT101	LINEAR ALGEBRA & CALCULUS	L	T	P	J	C
	(Common to all B.E. / B. Tech. Courses)	3	1	0	0	4
UNIT I	MATRIX EIGEN VALUE PROBLEM					9+3

Determining Eigen values and Eigenvectors – Properties of Eigen values and Eigenvectors - Some applications of Eigen value problems – Eigen value problems arising from population models (Leslie model) – Elastic deformations – Cayley Hamilton Theorem (statement only) and its applications.

UNIT II	ORTHOGONAL TRANSFORMATION OF REAL SYMMETRIC MATRIX	9+3
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Diagonalization of a real symmetric matrix–Quadratic form– Canonical form – Nature of the quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation – Some Applications: Transformation to Principal axes- Conic sections – Solving first order linear system using diagonalization.

UNIT III	APPLICATIONS OF DIFFERENTIAL CALCULUS	9+3
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Radius of Curvature in Cartesian co-ordinates – Centre and circle of curvature in Cartesian co-ordinates – Evolutes – Envelopes.

UNIT IV	FUNCTIONS OF SEVERAL VARIABLES	9+3
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Partial derivatives –Total derivatives – Jacobians – Taylor's expansion of functions of two variables – Errors and Approximations – Maxima and Minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT V	SECOND ORDER LINEAR ORDINARY DIFFERENTIAL EQUATIONS	9+3
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Homogeneous Linear ODEs with constant coefficients – Linear ODE with variable coefficients - Cauchy's and Legendre's Equations – Method of variation of parameters – Methods of undetermined coefficients - Applications: Modelling of Free Oscillations of a Mass-Spring system.

L : 45 T:15 P: 0 J: 0 Total: 60 PERIODS

TEXT BOOKS

- 1 B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2015.
2. James Stewart, Calculus, 7th Edition, Cengage Learning, 2012.

REFERENCES

- 1 Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2018.
- 2 Howard Anton, Elementary Linear Algebra, 11th Edition, Wiley, 2013.
- 3 David C Lay, Linear Algebra and its applications, Pearson, 2018.
- 4 G.B.Thomas, Calculus, 12th Edition, Pearson Education India, 2015.
- 5 T.Veerarajan, Engineering Mathematics, 3rd Edition, Tata McGraw-Hill, New Delhi, 2011.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know about Eigen values and Eigen vectors and its role in the system of equations.
- CO2** Transform the real symmetric matrix from quadratic form to canonical form by means of orthogonal transformation.
- CO3** Determine the radius, centre and circle of curvature of any curve.
- CO4** Expand the given function as series and locate the maximum and minimum for multivariate function and also using mathematical software.
- CO5** Solve the second order linear differential equations with various methods and apply them in some physical situations.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs) / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3		2	2				2	2		2			
CO2	3	3		2	2				2	2		2			
CO3	3	3		1	2				2	2		2			
CO4	3	3		1	2				2	2		2			
CO5	3	3		1	2				2	2		2			

19CST101	PROGRAMMING FOR PROBLEM SOLVING	L	T	P	J	C
	(Common to All Circuit Branches.)	3	0	0	0	3
UNIT I	INTRODUCTION TO PROBLEM SOLVING TECHNIQUES					9
Fundamentals - Computer Hardware – Computer Software - Algorithms - Building blocks of algorithms (statements, state, control flow, functions) - Notation (pseudo code, flow chart, and programming language) -Problem formulation - Algorithmic problem solving - Simple strategies for developing algorithms (iteration, recursion). Illustrative problems.						
UNIT II	C PROGRAMMING BASICS					9
Introduction to ‘C’ Programming –Fundamental rules – Structure of a ‘C’ program – Compilation and Linking processes –Constants, Variables, keywords, Identifier, Delimiters – Declaring and Initializing variables – Data Types – Operators and Expressions –Managing Input and Output operations – Decision Making and Branching –Looping statements –Illustrative programs.						
UNIT III	ARRAYS AND STRINGS					9
Arrays – Characteristics, Initialization – Declaration – One dimensional and two dimensional arrays - String- String operations – String Arrays. Simple programs-Sorting - Searching – Matrix operations (Addition, subtraction and Multiplication) –Illustrative programs.						
UNIT IV	FUNCTIONS AND POINTERS					9
Function – Definition of function – User-defined Functions - Declaration of function – Call by reference – Call by value – Recursion – Pointers - Definition – Initialization –Pointer arithmetic – Pointers and arrays –Illustrative programs.						
UNIT V	STRUCTURES AND UNIONS					9
Defining Structures and Unions – Structure declaration – Need for Structure data type - Structure within a structure - Union - Programs using structures and Unions - Pre-processor directives – Illustrative programs.						
		L : 45	T: 0	P: 0	J: 0	Total: 45 PERIODS

TEXT BOOKS

- 1 E.Balagurusamy, “Fundamentals of Computing and Computer Programming”, 2nd Edition Tata McGraw-Hill Publishing Company Limited, (2012).
2. Ashok.N.Kamthane,“ Computer Programming”, Pearson Education (India) (2010).

REFERENCES

- 1 Byron Gottfried, “Programming with C”, 2nd Edition, (Indian Adapted Edition), TMH
- 2 Stephan G kochan, “Programming in C” Pearson Education (2008).
- 3 P.Sudharson, “Computer Programming”, RBA Publications (2008).
- 4 Yashavant P. Kanetkar. “Let Us C”, BPB Publications, 2014.
5. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.

COURSE OUTCOMES

At the end of the course student should be able to:

CO1 Develop algorithmic solutions to solve simple computational problems.

CO2 Think logically and understand the basic concepts of C and write simple C programs.

CO3 Write programs using arrays and strings.

CO4 Write programs and solve problems using functions and pointers.

CO5 Apply the concepts of structures and unions in solving problems.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3			1	2							2	3		
CO2		3	3	2										3	3
CO3	2	2		2	2								2	2	
CO4	2	2	3	2			1						2		
CO5	2	2	2	2					2					2	

19GET102	BASIC CIVIL AND MECHANICAL ENGINEERING	L	T	P	J	C
	(Common to CSE, ECE ,EEE, E&I, IT and BME)	3	0	0	0	3
UNIT I	CIVIL ENGINEERING MATERIALS AND SURVEYING					11
Introduction: Civil engineering-scope of civil engineering-building materials- Brick, stone, cement, concrete, properties-uses Surveying: Objects – types – classification – principles – measurements of distances – angles – Concepts of leveling – determination of areas – illustrative examples.						
UNIT II	BUILDING COMPONENTS					10
Sub Structure: Types of foundation - Bearing capacity – Requirement of good foundations. Superstructure: Types of structure - Types of masonry – beams – columns – lintels – roofing – flooring – plastering.						
UNIT III	POWER PLANT ENGINEERING					8
Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric, Nuclear and Solar Power plants – Merits and Demerits – working principle of Pumps - Single, Double acting and Centrifugal Pumps.						
UNIT IV	IC ENGINES, REFRIGERATION AND AIR CONDITIONING SYSTEM					8
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles –Principle of Vapour compression system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.						
UNIT V	BASIC MANUFACTURING PROCESSES					8
Foundry: Introduction- patterns – moulding –casting - cupola furnace. Welding: Introduction-Classification – ARC, TIG, MIG welding, Gas welding, soldering and brazing. Machining process: Introduction-Classification – lathe and drilling machines.						
		L :45	T: 0	P: 0	J: 0	T:45 PERIODS
TEXT BOOKS						
1	Naveen Sait.A., Soundararajan.R., “Basic Civil and Mechanical Engineering”, RP Publications, Coimbatore, (2017).					
2	Venugopal K and Prahu Raja V, “Basic Mechanical Engineering”, AnuradhaPublishers, Kumbakonam, (2017).					
REFERENCES						
1	Shanmugam G and Palanichamy M S, “Basic Civil and Mechanical Engineering”,Tata McGraw Hill Publishing Co., New Delhi, (2017).					
	Rangwala,S.C., “ Engineering Materials” , Charotar Publishing House, Anand, 2016.					
3	Surendra Singh, “Building Materials” Vikas Publishing Company, New Delhi, 2016.					
4	Shantha Kumar S R J., “Basic Mechanical Engineering”, Hi-tech Publications, Mayiladuthurai, (2017).					
5	Rao, P N, —Manufacturing Technology: Foundry, Forming And Welding”, Tata McGraw-Hill, New Delhi, 2016.					
COURSE OUTCOMES:						
At the end of the course students should be able to						
CO1	Describe about building materials & surveying equipments in real time.					
CO2	Outline the basic building components and requirements of good foundation.					
CO3	Identify the possibilities of energy conversion from various energy sources using power plants.					
CO4	Summarize the working principles of various Mechanical systems used in day today applications.					
CO5	Apply the various basic Manufacturing processes to make products.					

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2					2		2	2		2	2		3
CO2	2				2				2	2			2		2
CO3	3						2		2	2		2	2		3
CO4	2						2			2		3		2	2
CO5	2				2		3		2	2		2	2	2	2

19PYB102	PHYSICS OF MATERIAL AND PHOTONICS	L	T	P	J	C
	(Common to CSE & IT)	3	0	2	0	4
UNIT I	CRYSTAL PHYSICS					9
Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures.						
UNIT II	SEMICONDUCTOR PHYSICS					9
Intrinsic Semiconductors – Energy band diagram – direct and indirect bandgap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors- Photodetectors(PIN & Avalanche)- Solar cell-IV characteristics.						
UNIT III	MAGNETISM					9
Basic concepts – magnetic moment, susceptibility, permeability. Origin of magnetic moment – Bohr magneton –Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials – Ferrites and its applications. Magnetic storage devices-magnetic hard disc, bubble memory.						
UNIT IV	MODERN ENGINEERING MATERIALS					9
Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, applications – Nanomaterials: Properties –Top-down process: Ball milling method- Bottom –up process: Physical vapour deposition method (Thermal Evaporation)- Carbon Nanotubes- Preparation by pulsed laser deposition method, properties and applications.						
UNIT V	LASER AND FIBER OPTICS					9
Spontaneous and stimulated emission- Population inversion -Einstein's A and B coefficients - derivation. Types of lasers – Nd:YAG, CO ₂ , Semiconductor lasers -applications. Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Losses in optical fibre- attenuation, dispersion, bending - Fibre Optical Communication system.						

LIST OF EXPERIMENTS(ANY FIVE)

1. Determination of wavelength of mercury spectrum – Spectrometer grating
2. Particle size determination using Diode Laser.b)Determination of Laser parameters – Wavelength.
3. To find the numerical aperture of a given optic fibre and hence to find its acceptance angle.
4. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
5. Determination of thickness of a thin wire – Air wedge method.
6. Determination of Band gap of semiconductor material.

L :45 T: 0 P: 30 J: 0 T: 75 PERIODS

TEXT BOOKS

- 1 Gaur R.K. And Gupta S.L, “Engineering Physics”, Dhanpat Rai publishers, 2013
2. Dr.M.N.Avandhanulu, Dr.P.G.Kshirsagar, “A Text book of Engineering Physics”, S.Chand,

REFERENCES

- 1 Rajendran.V, Engineering Physics,Tata Mcgraw-Hill Publishing Company Limited, New Delhi.2017
- 2 Engineering Physics, Wiley, 2013
- 3 A.S.Vasudeva, “Modern Engineering Physics”, S.Chand, 2001
- 4 B.K.Pandey Chaturvedi, “Engineering Physics”, Cengage Learning, 2012
- 5 Charles Kittel, “Solid State Physics”, Wiley(2009)

COURSE OUTCOMES :

At the end of the course student should be able to:

CO1 Understand the properties of the crystalline materials.

CO2 Identify the properties of semiconducting materials and its applications

CO3 Classify the magnetic materials based on the properties and employ it to act as an memory storage device.

CO4 Comprehend the preparation and properties of Nano materials for industrial applications.

CO5 Understand the basics and applications of photonics and fiber optics technology.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	1													3
CO2	3	3													3
CO3	3	3	2												3
CO4	3	2	1	2		1	1					1			3
CO5	3	2	1									1			3

19ENB101	COMMUNICATIVE ENGLISH	L	T	P	J	C
	(Common to all B.E. / B. Tech. Courses)	2	0	2	0	3
	SYNTAX & COMPREHENSIVE SKILLS					
UNIT I	FUNCTIONAL GRAMMAR					12
Vocabulary building – (Word formation –Prefixes & Suffixes, root words, One word substitution) – Parts of speech - Tenses - Voice - Concord (Subject & Verb agreement) – Articles – Prepositions – Cause and Effect Expressions – ‘If’ Conditionals.						
UNIT II	READING					10
Reading techniques – SQ3R– Reading and understanding the Context - Cloze exercises – Reading & note-making –Transfer of information (bar chart, flowchart & Pie chart) – Reading and reviewing Books/Articles.						
UNIT III	WRITING					13
Syntax and Sentence construction - Permission letter (for Industrial Visit & In-plant training) - Expository writing – Discourse markers – Technical writing – (Recommendation – Report Writing) – Checklist.						
	AUDITORY AND ORATORICAL SKILLS					
UNIT IV	LISTENING					10
Listening for general content – Listening for specific information - Listening to telephonic Conversation – Listening and note-taking – Listening and synthesizing information.						
UNIT V	ORAL COMMUNICATION					15
Greetings, Formal and informal introduction of self and others – Stress and Intonation – Word stress & Sentence stress – Describing an object or an event – Presentation skills(General topic) – Conversational skills – four types of speeches – Extempore, Manuscript, Impromptu, Memorized.						
L : 30 T: 0 P:30 J: 0 Total: 60 PERIODS						
TEXT BOOKS						
1 Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice, Oxford University Press, New Delhi, 2011.						
2. Rizvi, Ashraf. M. Effective Technical Communication, Tata McGraw-Hill, New Delhi, 2005.						
REFERENCES						
1 Muralikrishna, & Sunita Mishra. Communication Skills for Engineers. Pearson, New Delhi. 2011						
2 Mitra K. Barun, “Effective Technical Communication – A Guide for Scientists and Engineers”, Oxford University Press, New Delhi, 2006.						
3 Leo Jones, Richard Alexander, New International Business English, updated Edition, Cambridge University Press, NY, USA.						
4 Smith—Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason USA.						
5 Sharon J. Gerson, Steven M. Gerson, “Technical Writing – Process & Product”. 3rd Edition, Pearson Education (Singapore) (P) Ltd., New Delhi.						
COURSE OUTCOMES						
At the end of the course student should be able to:						
CO1 Use their active and passive vocabulary and construct basic sentence structures.						
CO2 Become active readers who comprehend ambiguity and complexity, and can articulate their own interpretations.						
CO3 Write effectively and flawlessly avoiding grammatical errors for a variety of professional and social settings.						
CO4 Make learners acquire listening skills in both formal and informal contexts.						
CO5 Exhibit their skills for effective communication in personal and official conversations/ situations.						

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1		2		1						3					
CO2		2		2		2			2	3	2				
CO3		2		1					2	3					
CO4		2							3	3					
CO5				3					3	3	2				

19GEB101	DESIGN THINKING AND INNOVATION	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	1	0	0	4	3
UNIT I	INTRODUCTION TO DESIGN THINKING					3+12
A brief insight to Design Thinking and Innovation- People Centered Design & Evoking the ‘right problem’- Purpose of Design Thinking- Design Thinking Framework.						
UNIT II	PROCESS IN DESIGN THINKING (EMPATHY, DEFINE)					3+12
Design Thinking Process – Empathy – Uncovering and Investigating Community Concerns - Define: Examine and Reflect on the problem.						
UNIT III	CONCEPTING AND BUILDING (IDEA, CREATE)					3+12
Generating Ideas-Identifying top three ideas-Bundling the Ideas and create concepts-Rapid Prototyping						
UNIT IV	TESTING, REFINING AND PITCHING THE IDEAS					3+12
Importance & Testing the Design with People-Retest and Redefine Results-Creating a Pitch for the design.						
UNIT V	VALUE PROPOSITION DESIGN					3+12
Business Vs Startup-Briefing the Problem-Problem Validation and User Discovery- Challenge Brief.						
L :15 T: 0 P: 0 J: 60 T:75 PERIODS						

TEXT BOOKS

- 1 Robert A Curedale, Design Thinking Process & Methods 4th Edition, December 2017, Design Community College Inc.
- 2 Andrew Pressman, Design Thinking: A Guide to Creative Problem Solving for Everyone, First Edition, Nov 2018, Routledge.

REFERENCES

- 1 Idris Mootee, Design Thinking for Strategic Innovation - What They Can't Teach You at Business or Design School, First Edition, 2017, Wiley.
- 2 Yves Pigneur, Greg Bernarda, Alan Smith, Trish Papadacos Alex Osterwalder, Value Proposition Design: How to Create Products and Services Customers Want, 2015, Wiley.
- 3 Brown, Tim, and Barry Katz. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, 2009, Harper Business.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Learn new approach-design thinking—that enhances innovation activities in terms of market impact, value creation, and speed.
- CO2** Feel the Empathy and can define their problems based on the Community Concerns
- CO3** Strengthen their individual and collaborative capabilities to identify customer needs, create sound concept hypotheses, collect appropriate data, and develop a prototype that allows for meaningful feedback in a real-world environment
- CO4** Translate broadly defined opportunities into actionable innovation possibilities and recommendations for client organization
- CO5** Become an Entrepreneurs

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2		3			3	3	2	2	2		3	2	1	2
CO2		1			2						2				
CO3				3		2							2	1	
CO4	1	2		2			2	1						2	1
CO5					1		1		1			1			

LIST OF EXPERIMENTS**A) Simple C Programming 30**

1. Solving problems using I/O Statements, Operators & Expressions.
2. Programs using Conditional Statements and Looping.
3. Programming for one dimensional and two dimensional arrays.
4. Solving problems using user defined, pre defined and Recursive functions
5. Programs using Strings and Pointers
6. Programs using Structures and Unions

* Flow chart and pseudo code are essential

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS**Hardware**

- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
- Printers – 3 Nos.

Software

- OS – Windows / UNIX Clone
- Compiler – C

L: 0 T:0 P:30 J:0 TOTAL:30 PERIODS**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1: Write simple C programs using basic C concepts (sequential programs)
 CO2: Write C programs using concepts in control statements (selection and repetition)
 CO3: Solve cases applying concept of one- and two-dimensional arrays
 CO4: Apply the concept of strings, pointers and functions in solving real world problems
 CO5: Write C programs to solve problems using Unions and Structures.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3			1	2							2	3		
CO2		3	3	2										3	3
CO3	2	2		2	2								2	2	
CO4	2	2	3	2			1						2		
CO5	2	2	2	2					2					2	

STRUCTURE FOR STUDENT INDUCTION PROGRAM**STUDENT INDUCTION PROGRAM - PURPOSE & CONCEPT**

Purpose of the Student Induction Program is to help new students adjust and feel comfortable in the new environment, inculcate in them the ethos and culture of the institution, help them build bonds with other students and faculty members, and expose them to a sense of larger purpose and self exploration. The term induction is generally used to describe the whole process whereby the incumbants adjust to or acclimatize to their new roles and environment. In other words, it is a well planned event to educate the new entrants about the environment in a particular institution, and connect them with the people in it. Student Induction Program engages with the new students as soon as they come into the institution; regular classes start only after that. At the start of the induction, the incumbants learn about the institutional policies, processes, practices, culture and values, and their mentor groups are formed. Then the different activities start, including those which are daily.

Here is a list of activities:

- Physical Activity
- Creative Arts and Culture
- Mentoring & Universal Human Values
- Familiarization with College, Dept./Branch
- Literary Activity
- Proficiency Modules
- Lectures & Workshops by Eminent People
- Visits in Local Area
- Extra-Curricular Activities in College
- Feedback and Report on the Program

The time during the Induction Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it. These are included under Proficiency Modules.

There will be a 3-week long induction program for the UG students entering the institution, right at the start. Normal classes start only after the induction program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

DAILY ACTIVITY

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

PHYSICAL ACTIVITY

This would involve a daily routine of physical activity with games and sports. There would be games in the evening or at other suitable times according to the local climate. These would help develop team work besides health. Each student could pick one game and learn it for the duration of the induction program and hopefully, continue with it later.

CREATIVE ARTS

Every student would chose one skill related to the arts whether visual arts or performing arts. Examples are painting, music, dance, pottery, sculpture etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, flow into engineering design later.

MENTORING AND UNIVERSAL HUMAN VALUES

Mentoring and connecting the students with faculty members is the most important part of student induction. Mentoring takes place in the context and setting of *Universal Human Values*. It gets the student to explore oneself and experience the joy of learning, prepares one to stand up to peer pressure and take decisions with courage, be aware of relationships and be sensitive to others, understand the role of money in life and experience the feeling of prosperity. Need for character building has been underlined by many thinkers, universal human values provide the base. Methodology of teaching this content is extremely important. It must not be through do's and don'ts, but by getting the students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. The role of group discussions, however, with clarity of thought of the teachers cannot be over emphasized. It is essential for giving exposure, guiding thoughts, and realizing values.

The teachers must come from all the departments rather than only one department like HSS or from outside of the Institute. Experiments in this direction at IIT(BHU) are noteworthy and one can learn from them. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It is to open thinking towards the self. Universal Human Values discussions could even continue for rest of the semester as a normal course, and not stop with the

Induction program. Besides drawing the attention of the student to larger issues of life, it would build relationships between teachers and students which last for their entire 4-year stay and possibly beyond.

OTHER ACTIVITY

Activities that are not there on a daily basis, but are conducted for 3-4 days (typically in the afternoons) and change thereafter.

FAMILIARIZATION WITH COLLEGE, DEPARTMENT/BRANCH

The incoming students should be told about the credit and grading system, and about the examinations. They should be informed about how study in college differs from study in school. They should also be taken on a tour of the college and shown important points such as library, canteen, and other facilities. They should be shown their department, and told what it means to get into the branch or department. Describe what role the technology related to their department plays in society and after graduation what role the student would play in society as an engineer in that branch. A lecture by an alumnus of the Dept. would be very helpful in this regard. They should also be shown the laboratories, workshops and other facilities. The above should be done right in the first two days, and then over the afternoons thereafter, as appropriate.

LITERARY ACTIVITY

Literary activity would encompass reading a book, writing a summary, debating, enacting a play etc.

PROFICIENCY MODULES

The induction program period can be used to overcome some critical lacunas that students might have, for example, English, computer familiarity etc. These should run like crash courses, so that when normal courses start after the induction program, the student has overcome the lacunas substantially. We hope that problems arising due to lack of English skills, wherein students start lagging behind or failing in several subjects, for no fault of theirs, would, hopefully, become a thing of the past.

LECTURES & WORKSHOPS BY EMINENT PEOPLE

Lectures by eminent people should be organized, say, once a week. It would give the students exposure to people who are eminent, in industry or engineering, in social service, or in public life. Alumni could be invited as well. Motivational lectures about life, meditation, etc. by Ramakrishna Mission, Art of Living, Vivekananda Kendra's, S-VYASA, etc. may be organized. Workshops which rejuvenate or

bring relief to students would also be welcome, such as, Art of Living workshops (3 sessions, 9 hours).

VISITS IN LOCAL AREA

A couple of visits to the local landmarks including historical monuments should be organized. This would familiarize the students with the area together with bonding with each other, like in a picnic. Visits should also be organized to a hospital, orphanage or a village. These would expose them to people in suffering or to different lifestyles. This might also sensitize them to engineering needs in these areas.

EXTRA-CURRICULAR ACTIVITIES IN COLLEGE

The new students should be introduced to the extra-curricular activities at the college university. They should be shown the facilities and informed about activities related to different clubs etc. This is when selected senior students involved in or leading these activities can give presentations, under faculty supervision.

FEEDBACK AND REPORT ON THE PROGRAM

Students should be asked to give their mid-program feedback. They should be asked to write their opinions about the program at the end of the first week or so. The feedback should be used to make any mid-course correction, if any. Finally, at the end of the program, each group (of 20 students) should be asked to prepare a single report on their experiences of the program. On the second last day, each group should present their report in front of other groups. Immediately after their presentation, they should submit their written report. This will also serve as a closure to the program. Finally, a formal written or online anonymous feedback should be collected at the end of the program.

UNIT I ECOSYSTEM

6

Ecosystem- Foodchains, Foodwebs and Ecological pyramids - (a) Forest ecosystem (b) Aquatic ecosystems (Ponds & Oceans). Field study of simple ecosystems– pond, river, hill slopes.

UNIT II BIODIVERSITY

6

Introduction to biodiversity– Values of biodiversity– threats to biodiversity–endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds, etc.,

UNIT III ENVIRONMENTAL POLLUTION

6

Definition–causes, effects and control measures of:(a) Air pollution(b) Water pollution (c) Soil pollution (d) Noise pollution (e) Nuclear hazards. Field study of local polluted site–Urban/ Rural / Industrial/ Agricultural.

UNIT IV ENERGY RESOURCES

6

Introduction – (a) Solar energy (b) Wind energy (c) Tidal energy (d) Geothermal energy (e) Nuclear Energy Field study of local area.

UNIT V ENVIRONMENTAL MANAGEMENT

6

Sustainable development - Role of information technology in environment and human health – environmental protection Acts -Solid waste management and Rain water harvesting - E -waste and Concepts of Green Chemistry-Radiation hazards- Case studies.

L :30 T: 0 P: 0 J: 0 T: 30 PERIODS**TEXT BOOKS**

- 1 Dr.A.Ravikrishnan, “Environmental Science &Engineering” Sri Krishna Hitech Pub.Co.Pvt.Ltd.2013
- 2 Benny Joseph, “Environmental Science & Engineering” Tate McGraw-Hill Pub.Co.Ltd, New Delhi.2009

REFERENCES

- 1 G.Tyler Miller, “Environmental Science” Cengage Learning India Pvt.Ltd.New Delhi.2011
- 2 Dr.DebangSolanki, “Principles of Environmental Chemistry” Prateeksha Pub. Jaipur.2011.
- 3 Gilbert M. Masters and Wendell. P.Ela, “Introduction to Environmental Engineering and Science” PHI Learning Pvt. Ltd. New Delhi.2010
- 4 Deeksha Dave and S.S. Katewa, “Environmental Science & Engineering” Learning India Pvt.Ltd.New Delhi.2011
- 5 Benny Joseph “Environmental Science & Engineering” Tata McGraw-Hill Pub.Co.Ltd, New Delhi. 2009

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Gain basic knowledge of Ecosystem.
- CO2** Understand the role and conservation of biodiversity
- CO3** Gain competency in solving environmental issues of pollution
- CO4** Adopt the methodologies in find the changes in renewable energy
- CO5** Understand the development and improvement in standard of living has led to serious Environmental management.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1															
CO2		1													
CO3						2									
CO4															
CO5							1								

SEMESTER II

19CST102	OBJECT ORIENTED PROGRAMMING	L	T	P	J	C
	(Common to CSE & IT)	3	0	0	0	3

UNIT I	INTRODUCTION TO OOP	9
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Object Oriented Programming concepts –Objects - Classes – Inheritance – Polymorphism – Abstraction -Encapsulation, Features of Java, Basics of Java programming using classes, constructors, methods-access specifiers - Static members, Data types, Variables, Operators.

UNIT II	BASICS FEATURES OF JAVA	9
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Byte Code and Java Virtual Machine, JDK- Control structures including selection, Looping - class and methods in java, constructors, overloading, this, super, staticArray.

UNIT III	INHERITANCE AND POLYMORPHISM	9
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Inheritance- Super class - Sub class - protected members - constructors in sub class – Overriding - Abstract class - Final methods and classes, Interfaces, Packages.

UNIT IV	MULTITHREADING IN JAVA	9
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Thread life cycle and methods, Thread Creation, Thread synchronization, Inter-thread communication, Exception handling with try-catch-finally, Generic Programming-Generic Classes -.generic methods-Bounded types.

UNIT V	DESIGNING JAVA APPLETS	9
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Applet life cycle, Simple applet, Swing class – Layout Managers - Event Handling -Button and mouse movement (Active listener).

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Java: The Complete Reference (Eleventh Edition), Herbert Schildt, TMH, 2018.

REFERENCES

- 1 Introduction to Java Programming (Seventh Edition -Comprehensive Version), Daniel Liang, Pearson, 2009.
- 2 Programming in Java (Revised 2nd Edition), Sachin Malhotra & Saurabh Chaudhary, Oxford University Press, 2011.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the concepts of the language and write basic programs in Java.
- CO2** Write simple class programs incorporating looping and conditional statements.
- CO3** Apply the concepts of inheritance and polymorphism.
- CO4** Build Java applications using threads and exception handling.
- CO5** Construct Java applets and GUI applications in java.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2		3									1	2	
CO2	1	1		3	1								1	1	
CO3	1	3	3	3	1	3				1	1	3	1	3	3
CO4	3		3				2			1			3		3
CO5			3	3		1				2					3

19EET103	ELECTRIC CIRCUITS AND ELECTRON DEVICES	L	T	P	J	C
	(Common to CSE & IT)	3	0	0	0	3
UNIT I	DC CIRCUITS					9
Voltage, current, power, energy – Resistive elements – Ohm’s law – series and parallel circuits – Ideal and practical current sources – Kirchoff’s law - simple problems						
UNIT II	AC CIRCUITS					9
Single phase circuits: Waveforms, frequency, peak value, effective value – Inductive and capacitive elements – Impedance, power and power factor. Three phase circuits and its advantages – generation of three phase power (Block diagram representation)						
UNIT III	ELECTRICAL INSTALLATIONS					9
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.						
UNIT IV	SEMI CONDUCTOR DEVICES					9
Structure, working principle and V-I characteristics of PN junction diode, Zener diode, BJT, JFET, MOSFET and SCR.						
UNIT V	APPLICATION OF SEMICONDUCTOR DEVICES					9
Rectifiers, voltage regulator, photodiode - PV Cells, UPS, LED, LCD, OLED, LASER, PhotoTransistor, Opto Isolator, clipper, clamper.						
		L : 45	T: 0	P:0	J: 0	Total: 45 PERIODS

TEXT BOOKS

- 1 Muthusubramaniam R, Salivahanan S, “Basic Electrical and Electronics Engineering”, Tata McGraw Hill Publishers, 2018.
- 2 David A. Bell, “Electronic Devices and Circuits”, Prentice Hall of India, 5th Edition, 2008.

REFERENCES

- 1 Mehta VK, Rohit Mehta, “Principles of Electrical Engineering and Electronics”, S Chand and Company 2016.
- 2 V.Mittle, “Basic Electrical Engineering”, Tata McGraw Hill Publishers, 2017.
- 3 S. Poornachandra, B. Sasikala, “Electronic Devices and Circuits”, Scitech Publications India, (P) Ltd, Chennai, 2016.
- 4 D. Roy Choudhry, Shail Jain, “Linear Integrated Circuits”, New Age International Pvt. Ltd., 2014.
- 5 Salivahanan.S, Vallavaraj.A and Kumar.N.S, “Electronic Devices and Circuits” Tata McGraw Hill, 2012.

COURSE OUTCOMES

At the end of the course student should be able to:

CO1 Familiarize the elementary concept of DC circuits

CO2 Understand the values and concepts of AC circuits

CO3 Acquire knowledge of basics of electronic devices

CO4 Gain knowledge on power amplifiers

CO5 Understand the operation of linear electronics and switching circuits.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3		3			1									
CO2	3		3								3		2		
CO3	3		3			1				2	3	1		2	
CO4	3				2							1			2
CO5	3	2					1				3	1		2	

UNIT I MULTIPLE INTEGRALS**9**

Double integration (Cartesian co-ordinates) – Change of order of integration – Applications of double integral (Area) – Triple Integration (Cartesian co-ordinates) – Applications: Volume as triple integrals and solids of revolution.

UNIT II VECTOR CALCULUS**9**

Derivatives: Gradient of a scalar field. Directional derivative – Divergence of a vector field – Curl of a vector field – Solenoidal and Irrotational of a vector – Theorems in divergence of Gauss, Stoke's and Greens (statements only) – Verification of theorem.

UNIT III COMPLEX VARIABLES**9**

Derivatives of $f(z)$ – Analytic function – Cauchy-Riemann Equations – Harmonic function – Harmonic conjugate – Construction of Analytic function – Conformal Mapping – Conformality of $w = z + c$, cz , $1/z$ – Mobius transformations – Application to flow problems.

UNIT IV COMPLEX INTEGRATION**9**

Cauchy's integral theorem – Cauchy's integral formula – Taylor's series – Zeros of an analytic function – singularities – Laurent's series – Residues – Cauchy Residue theorem.

UNIT V LAPLACE TRANSFORMS**9**

Conditions – Transforms of elementary functions – Properties - Transform of derivatives and integrals – Unit step function (Heaviside function) – Dirac's Delta function – Laplace transform of periodic functions – Inverse Laplace transforms - Convolution theorem – Partial fraction method – Applications to solution of linear ordinary differential equations of second order with constant coefficients – Simultaneous linear equations with constant coefficients.

List of SCILAB / MATLAB Programmes:**30**

1. Introduction to SCILAB / MATLAB.
2. Determining the roots of polynomial equations.
3. Basic integration problems.
4. Evaluating double & triple integrals.
5. Calculating area using double integration.
6. Calculating volume – Simple problems.
7. Curve fitting.
8. Graph with 2D & 3D plots.

L : 45 T: 0 P:30 J: 0 Total: 75 PERIODS**TEXT BOOKS**

- 1 B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2015.
2. Dennis G.Zill and Michael P. Cullen, Advanced Engineering Mathematics, 2nd Edition, CBS Publishers, 2012.

REFERENCES

- 1 Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2018.
- 2 G.B.Thomas, Calculus, 12th Edition, Pearson Education India, 2015.
- 3 T.Veerarajan, Engineering Mathematics, 3rd Edition, Tata McGraw-Hill, 2011.
- 4 N.P. Bali and Manish Goyal A, Advanced Engineering Mathematics, 7th Ed, Laxmi Publications, 2010.
- 5 Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill, 2017.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Evaluate area and volume in Cartesian coordinates using double and triple integrals and also using mathematical software.
- CO2** Evaluate gradient, divergence and curl and solve engineering problems involving cubes, rectangular parallelepipeds by applying various integral theorems. Apply mathematical software to find gradient, divergence and curl.
- CO3** Test the analyticity, construct the analytic function and transform complex functions from z-plane to w-plane graphically by using conformal mapping.
- CO4** Evaluate real and complex integrals over suitable closed path using various integral theorems.
- CO5** Apply Laplace transform techniques, transform functions in time domain to frequency domain and solve ordinary differential equation by using mathematical software.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3			2				2			1			
CO2	3	3			2				2			2			
CO3	3	3			2				2			1			
CO4	3	3			2				2			1			
CO5	3	3			2				2		2	2			

UNIT I MODERN BATTERIES

Batteries-Characteristics – Classification-Primary battery-Alkaline battery-Secondary battery-Lead acid battery-Nickel cadmium battery-Modern batteries-Zinc-air battery-Lithium ion battery-Solar cells-principle and working-Fuel cells-construction and working of H₂-O₂ fuel cell

UNIT II SPECTROSCOPIC TECHNIQUES**9**

Electroanalytical techniques- Conductometry (Titration of mixture of acids against strong base)- Potentiometry ((Fe²⁺ against K₂Cr₂O₇) - Spectroscopic Techniques-Basic principle and instrumentation of UV-Visible, AAS and Flame photometry - Estimation of sodium by flame photometry-Basics of Chromatography-Types- GC and HPLC

UNIT III NANO CHEMISTRY**9**

Basics-Distinction between nanoparticles and bulk materials- General methods -Top down and Bottom up approach- Chemical precipitation method -Wet chemical method-Chemical vapour deposition-Types (Nanoclusters, Nanorods, Nanotubes and Nanowires) - Application of nanotechnology in electronics, energy science and Medicine.

UNIT IV HIGH POLYMERS**9**

Engineering plastics – properties-Thermosetting and Thermoplastics – Polymers – PE - PVC –Teflon – Nylon-6:6.-Fabrication- Injection moulding- Composites: FRP - Biodegradable polymers.

UNIT V SOLID STATE AND LIQUID CRYSTALS**9**

Semiconductor-Types-Super conductors-Liquid crystals –classification, thermotropic and lyotropic liquid crystals, structure of liquid crystal forming compounds, Chemical properties, Applications of liquid crystals-LED applications

List of experiments (Any five)**30**

1. Determination of strength of HCl and CH₃COOH present in a mixture conductometrically
2. Estimation of strength of iron by potentiometric titration
3. Estimation of strength of iron by spectrophotometry
4. Determination of molecular weight of given polymer by Ostwald's viscometer
5. Synthesis of nanomaterials by wet chemical technique
6. Separation of components by chromatography technique
7. Determination of Strength of HCl by pH metry
8. Estimation of copper in brass by EDTA method
9. Estimation of calcium in milk powder by EDTA method
10. Estimation of Iodine in common salt by Iodometry

L :45 T: 0 P: 30 J: 0 T: 75 PERIODS

TEXT BOOKS

- 1 O.G.Palanna, “Engineering Chemistry” Tata McGraw-Hill Pub.Co.Ltd, New Delhi.2017.
2. Wiley, “Engineering Chemistry”, John Wiley & Sons, Inc, USA (2014]

REFERENCES

- 1 B. Sivasankar “Engineering Chemistry” Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2009).
- 2 R. Sivakumar and N Sivakumar, “Engineering Chemistry” Tata McGraw-Hill, Pub.Co.Ltd. New Delhi.2009
- 3 Dr.Sivanesan and Nandagopal, “Engineering Chemistry-I” V.K.Pub.Pvt.Ltd. 2011.
- 4 P.C.Jain & Monica Jain, “Engineering Chemistry” , Dhanapat Rai Publishing Company Pvt.Ltd. 2017.
- 5 Engineering chemistry (NPTEL e-Web book) by B.L.Tembe, Kamaluddin and M.S.Krishnan

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understanding the working principle of various energy storage devices.
- CO2** Apply various spectral and analytical techniques in the projects undertaken in the field of engineering and technology.
- CO3** Design environmentally benign method for nanoparticle synthesis.
- CO4** Obtain knowledge on importance of engineering materials for various applications.
- CO5** Develop analytical proficiency through lab skill sets to demonstrate in professional practice

CO/PO Mapping (S/M/W indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3														
CO2		1													
CO3				2											
CO4							1								
CO5		2													

UNIT I PROJECTION OF POINTS, LINES AND PLANE SURFACES**3+12**

Projection of points, Projection of straight lines located in the first quadrant, Projection of polygonal surface inclined to one reference planes.

UNIT II PROJECTION OF SOLIDS**3+12**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is parallel to one reference plane, perpendicular to other, Parallel to both the reference plane.

UNIT III SECTION OF SOLIDS**3+12**

Sectioning of above solids in simple vertical position by cutting planes, Parallel to one reference plane and Perpendicular to other.

UNIT IV ISOMETRIC PROJECTIONS & FREE HAND SKETCHING**3+12**

Principles of isometric projection, isometric scale, isometric drawings of simple solids

Free hand sketching:

Representation of Three Dimensional objects, General principles of orthographic projection, Need for importance of multiple views and their placement, First angle projection, layout views, Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT V BUILDING DRAWING**3+12**

Drawing of a plan, Elevation and sectioning of security room and residential building (Two bed rooms, kitchen, hall, etc.)

L: 15 T:0 P:60 J:0 TOTAL : 75 PERIODS**TEXT BOOKS**

1. N.D. Bhatt and V.M. Panchal, "Engineering Drawing" Charotar Publishing House, 53rd Edition, (2016).
2. K. R. Gopalakrishnan, "Engineering Drawing" (Vol.I & II), Subhas Publications (2014).

REFERENCES

1. K. V. Natarajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2016).
2. M.S. Kumar, "Engineering Graphics", D.D. Publications, (2016).
3. M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education (2015).
4. CADD Centre, Solid Edge, Reference Guide 14, 2015.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to End Semester Examinations on Engineering Graphics:

1. The examination will be conducted in practical mode. The maximum number of candidates per batch is 60. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each for a total of 100.
3. The answer paper shall consist of drawing sheets of A4 size only. The students will be permitted to use appropriate scale to fit solution within A4 size

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Draw projections of points, straight lines and plane surfaces.

CO2: Illustrate top view and front view of the solids.

CO3: Outline Sectioned Views of the solids.

CO4: Exhibit knowledge about isometric, perspective and orthographic projections.

CO5: Design simple residential and office buildings.

Assessment Pattern:

1. There will not be Internal Assessment Examination.
2. For Internal Assessment, Average marks in the Assignment will be reduced to 20 Marks and the Model test mark shall be reduced to 30 Marks making a total 50 Marks.
2. For End Semester Examinations, it will be conducted in internal mode with five questions, each of either or type covering all units of the syllabus, All questions will carry equal marks of 20 each making a total of 100.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	2					2		2					
CO2	2	2								3				2	
CO3	3									2				2	
CO4	3	2										3		2	
CO5						2						3			2

19ENP101	PROFESSIONAL COMMUNICATION	L	T	P	J	C
	(Common to all B.E. / B. Tech. Courses)	0	0	4	0	2
UNIT I	INTRODUCTION TO COMMUNICATION					10
Introduction to communication, The process of communication, Barriers to communication – Verbal & Nonverbal communication, Body language.						
UNIT II	READING AND LISTENING SKILLS					10
Reading and Summarizing – Precis writing – Phrase Reading – Listening to TED Talks – Listening to conversations.						
UNIT III	PROFESSIONAL WRITING					10
Resume & cover letter – Proposal writing (Project/Business proposal) - Business Letter (Quotations, Clarification, Placing orders & Complaint letter).						
UNIT IV	SPEAKING					15
Persuasive Speaking – Public Speaking – Negotiation Skills – Telephone Etiquettes – Group Discussion - Team building – Interview skills.						
UNIT V	SOFT SKILLS					15
Time Management - Stress Management – Inter & Intra personal skills – Professional ethics - Professional Networking & Social Skill.						

L : 0 T: 0 P:60 J: 0 Total: 60 PERIODS

TEXT BOOKS

- 1 Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice, Oxford University Press, New Delhi, 2011.
2. Professional Communication - Aruna Koneru—Oxford University Press, New Delhi.

REFERENCES

- 1 A Modern Approach to Verbal and Non-verbal Reasoning-R.S.Agarwal- S.Chand & Co., New Delhi.
- 2 Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason USA. 2007.
- 3 Mitra K. Barun, “ Effective Technical Communication – A Guide for Scientists and Engineers”, Oxford University Press, New Delhi, 2006.
- 4 Jeff Butterfield, “Soft skills for everyone”, Cengage Learning, New Delhi, 2011.
- 5 Leo Jones, Richard Alexander, New International Business English, updated Edition, Cambridge University Press, NY, USA.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Perceive the importance of verbal and non-verbal communication in the professional world along with its uses.
- CO2** Develop reading skills and listening skills by familiarizing them with different strategies.
- CO3** Acquire letter writing skills for effective communication both in formal and informal situations.
- CO4** Speak clearly, confidently, comprehensively, and communicate with one or many listeners using appropriate communicative strategies.
- CO5** Face the challenges of the globalized world with confidence and with the best communicative skills.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1				2					3	3					
CO2		2		2					3	3					
CO3				2					3	3					
CO4									3	3	2				
CO5				3			2		3	3	2				

19GEP101	WORKSHOP PRACTICES LABORATORY	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	0	0	4	0	2
LIST OF EXPERIMENTS						

GROUP A (CIVIL & MECHANICAL) **30**

CIVIL ENGINEERING **12**

Study of plumbing tools and Components

Preparation of threads in pipes

Preparation of single and multi-tap connections for domestic

Study of carpentry tools and its applications

Preparation of Cross Lap and Dove Tail Joints.

MECHANICAL ENGINEERING **18**

Study of different types of Welding and its applications

Preparation of Butt, Lap and Tee joints

Study of sheet metal and its applications

Preparation of Rectangular, Square Trays and Funnel

Demonstration of Lathe and Drilling Operations

Demonstration of Smithy and Foundry tools.

GROUP B (ELECTRICAL AND ELECTRONICS) **30**

ELECTRICAL ENGINEERING PRACTICE **18**

Residential house wiring using switches, fuse, miniature circuit breaker, indicator, Lamp and energy meter.

Fluorescent lamp wiring.

Stair-case wiring.

Measurement of electrical quantities –voltage, current, power & power factor in RL Circuit.

Measurement of energy using single phase energy meter.

Measurement of insulation resistance to earth of electrical equipment.

Measurement of single and three phase voltages.

Study of Iron Box, Emergency Lamp and Fan.

ELECTRONICS ENGINEERING PRACTICE **12**

Study of Electronic components and equipments –Resistor, color coding, measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.

Verification of logic gates: AND, OR, Ex-OR and NOT.

Generation of Clock Signal.

Soldering practice –Components Devices and Circuits Using general purpose PCB.

Characteristics of a PN Junction diode

L : 0 T: 0 P: 60 J: 0 Total:60 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

CO1 Demonstrate plumbing system and Carpentry for the required applications.

CO2 Relate the basic machining operations with engineering problems.

CO3 Apply different types of Welding processes and Sheet metal processes for the Industrial applications.

CO4 Illustrate Residential House wiring and simple wiring circuits.

CO5 Employ knowledge on measuring electrical quantities and usage of energy meters.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3			2									2		
CO2	3	3			1								2	1	
CO3	3												1	2	
CO4	3	3											1		
CO5	3				1									2	

LIST OF EXPERIMENTS

2. Solving problems using data types, variable and operators
3. Solving problems using arrays
4. Solving problems using Control structures
5. Programs using class, methods and objects using overloading
6. Programs using class and constructors
7. Programs employing inheritance
8. Programs employing Polymorphism
9. Programs employing packages
10. Solving problems using the concept of Exception Handling
11. Solving problems using the concept of Multithreading
12. Simple GUI application creation

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS**Hardware**

- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
- Printers – 3 Nos.

Software

- Java / J2SE Compiler, NetBeans

L: 0 T:0 P: 60 J:0 TOTAL:60 PERIODS**COURSE OUTCOMES**

At the end of the course student should be able to:

- CO1** Solve simple problems using data types, variables, operators in Java.
- CO2** Write simple programs employing control structures using classes and methods.
- CO3** Apply the concepts of inheritance, polymorphism and packages to solve real world problems.
- CO4** Solve problems using the concept of threads and exceptions.
- CO5** Build simple GUI applications for real time projects in java.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2		3									1	2	
CO2	1	1		3	1								1	1	
CO3	1	3	3	3	1	3				1	1	3	1	3	3
CO4	3		3				2			1			3		3
CO5			3	3		1				2					3

GUIDELINES

1. The scope of the project work is to enable the students in convenient groups (not more than 4 members) involving theoretical and experimental studies through Design Thinking approach.
2. The aim of the project work is to deepen comprehension of principles by applying them to a new problem based on the courses such as Linear Algebra & Calculus , Programming for Problem Solving , Basic Civil and Mechanical Engineering , Physics of Material and Photonics , Design Thinking and Innovation , Object Oriented Programming , Electrical Circuits and Electron Devices , Integral Calculus & Laplace Transforms , Engineering Chemistry , Engineering Graphics studied by the students in the first year of study but not limited to.
3. Project periods shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work as assigned by the guide and also to present the progress made in the project with periodical manner.
4. Creating a model/simulate the project using various tools / Implement the project by using languages. Analyze data, evaluate the results, conclude the appropriate solution and suggest for feature work.
5. The continuous assessment shall be made according to the regulation which is tabulated below.
6. The progress of the project is evaluated based on a minimum of two reviews.
7. The review committee may be constituted by the Head of the Department
8. Each student shall finally produce a comprehensive report covering Literature Survey, Empathy, Ideate, and Define, detailed work of project, Result, Conclusion and Future Work. This final report shall be typewritten form with specified guidelines.

L: 0 T: 0 P: 0 J: 30 TOTAL:30 PERIODS**COURSE OUTCOMES**

At the end of the course students should be able to

- CO1** Understand how to identify the issues and challenges of industry.
- CO2** Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.
- CO3** Reproduce, improve and refine technical aspects for engineering projects.
- CO4** Work as an individual or in a team in development of technical projects.
- CO5** Communicate and report effectively project related activities and findings

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3													3
CO2			3	3											
CO3			3	3	2						3		3		
CO4											3		3	2	
CO5												3			

19HST103	INDIAN CONSTITUTION	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	2	0	0	0	0
UNIT I	INTRODUCTION					6
Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.						
UNIT II	STRUCTURE AND FUNCTION OF CENTRAL GOVERNMENT					6
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.						
UNIT III	STRUCTURE AND FUNCTION OF STATE GOVERNMENT					6
State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.						
UNIT IV	CONSTITUTION FUNCTIONS					6
Indian Federal System – Center – State Relations – President’s Rule – Constitutional Amendments – Constitutional Functionaries – Assessment of working of the Parliamentary System in India.						
UNIT V	ELECTION COMMISSION					6
Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.						

L :30 T: 0 P: 0 J: 0 T:30 PERIODS

TEXT BOOKS

- 1 Durga Das Basu, “Introduction to the Constitution of India”, Prentice Hall of India, New Delhi.
- 2 R.C.Agarwal, “Indian Political System”, S.Chand and Company, New Delhi. (1997)

REFERENCES

- 1 Maciver and Page, “Society: An Introduction Analysis”, Mac Milan India Ltd., New Delhi.
- 2 K.L.Sharma, “Social Stratification in India: Issues and Themes”, Jawaharlal Nehru University, New Delhi. (1997)
- 3 Sharma, Brij Kishore, “Introduction to the Constitution of India”, Prentice Hall of India, New Delhi.
- 4 U.R.Gahai, “Indian Political System”, New Academic Publishing House, Jalaendhar.
- 5 R.N. Sharma, “Indian Social Problems”, Media Promoters and Publishers Pvt. Ltd.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Understand the functions of the Indian government
- CO2** Know the structure and functioning of central government.
- CO3** Understand functioning of Indian constituent.
- CO4** Analyze the functions of the Indian government
- CO5** Summarize the functioning of election commission.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2							3	2		2	2	3	3	2
CO2	2					2		3	2			2	3	3	2
CO3	2		2				2	3	2			2	3	3	2
CO4	2							3	2			2	3	3	2
CO5	2					2		3	2	2		2	3	3	2

SEMESTER III

19MAT201	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	J	C
	(Common to all B.E. / B. Tech. Courses)	3	0	0	0	3
UNIT I	FOURIER SERIES					9
Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic Analysis.						
UNIT II	FOURIER TRANSFORMS					9
Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem– Parseval's identity.						
UNIT III	PARTIAL DIFFERENTIAL EQUATIONS					9
Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second order with constant coefficients (Homogeneous Problems).						
UNIT IV	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS					9
Classification of partial differential equations -Solutions of one dimensional wave equation – One dimensional equation of heat Conduction – Steady state solution of two-dimensional equation of heat conduction (Excluding Infinite plate & Insulated edges).						
UNIT V	Z-TRANSFORMS					9
Z-transforms – Elementary properties – Inverse Z - Transform – Convolution theorem –Formation of difference equation –Solution of difference equations using z-transforms.						
		L : 45	T:0	P: 0	J: 0	Total: 45 PERIODS

TEXT BOOKS

- 1 Grewal, B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, 2017.
2. Ramana, B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2014.

REFERENCES

- 1 Bali, N.P. and Manish Goyal, "A Textbook of Engineering Mathematics", Fifth Edition, Laxmi Publications (P) Ltd., 2014.
- 2 Glyn James, "Advanced Modern Engineering Mathematics", Fourth Edition, Pearson Education, 2013.
- 3 Erwin Kreyszig, "Advanced Engineering Mathematics", Tenth Edition, Wiley India, 2015.
- 4 Dr. Sanjay Sharma., "Signals and Systems", S.K.Kataria & Sons, Publisher of Engineering & Computer Books, New Delhi, 2012.
- 5 Whlie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics" Tata McGraw Hill Education Pvt.Ltd, 6th Edition, New Delhi, 2012.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
- CO2** Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
- CO3** Form partial differential equations and solve certain types of partial differential equations.
- CO4** Know how to solve one dimensional wave equation, one dimensional heat equation and two dimensional heat equation in steady state using Fourier Series.
- CO5** Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3			2				2	1		2			
CO2	3	3			2				2	1		2			
CO3	3	3			2				2			2			
CO4	3	3		2	2				2			2			
CO5	3	3		2	2				2			2			

UNIT I INTRODUCTION TO SOFTWARE ENGINEERING**9**

The Nature of Software -Software Engineering - Software engineering Practice – Process Models: Generic – Prescriptive – Specialized - United Process - Personal and Team Process Models - Process Technology- Understanding Requirements-Design concepts & model- Software quality concepts & Review metrics.

UNIT II AGILE DEVELOPMENT**9**

Fundamentals of Agile: Introduction and background - Agile Manifesto and Principles - Agile vs. Traditional software development – Extreme Programming – Agile Process Models – kanban – Agile Tool(JIRA, GITHUB and Jenkins).

UNIT III AGILE SCRUM FRAMEWORK**9**

Introduction to Scrum - Project phases - Agile Estimation - Planning game - Product backlog - Sprint backlog - Iteration planning - User story definition - Characteristics and content of user stories - Acceptance tests and Verifying stories - Project velocity - Burn down chart - Sprint planning and retrospective - Daily scrum - Scrum roles Product Owner - Scrum Master - Scrum Team - Scrum case study - Tools for Agile project management.

UNIT IV USER INTERFACE DESIGN**9**

User Interface Analysis and Design – Design Concepts - Interface Analysis - Interface Design Steps- WebApp Interface Design – Agile UX – best practices – Ux workflow - Integrating UX and Agile development.

UNIT V SOFTWARE TESTING & SCM**9**

Software Testing Fundamentals – White Box Testing - Black-Box Testing. Unit Testing-Integration Testing-System Testing-User Acceptance Testing - Agile testing principles- testing methodologies-Agile testing quadrants – Scrum testing - Software Configuration Management - The SCM Repository - The SCM Process.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS**TEXT BOOKS**

- 1 Roger S.Pressman, Software engineering- A practitioner's Approach, 10th Edition, McGraw-Hill, 2017.
- 2 Ken Schawber, Mike "Agile Software Development with Scrum" Pearson Education, 2nd Edition, 2015

REFERENCES

- 1 Lisa Crispin, Janet Gregory, "Agile Testing; A Practical Guide for Testers and Agile Teams", Addison Wesley, 3rd Edition, 2015.
- 2 Robert C.Martin, " Agile Software Development, Principles, Patterns and Practices", Prentice Hall, 2nd Edition, 2014.
- 3 Alistair Cockburn, "Agile Software Development: The Cooperative Game", Addison Wesley, 2nd Edition, 2015.
- 4 Mike Cohn, "User Stories Applied: for Agile Software", Addison Wesley, 2nd Edition, 2015.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Identity the process and systematic methodologies involved in Software Engineering.
- CO2** Make use of various tools available for agile development to facilitate the project.
- CO3** Apply various scrum framework to design and develop the software projects
- CO4** Interpret the knowledge of design methods, including user interface and best practices.
- CO5** Evaluate the project using various Testing techniques..

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	2			1			1	2	3	2	
CO2		3	2		3		1		2		2			2	
CO3	3	2	3		1			1				1		2	
CO4	3	3	3	1	2									3	
CO5	3	3	3	3			1	1	2	2	1	1	2		

19ITT201	DATA STRUCTURES	L	T	P	J	C
	[Common to CSE & IT]	3	0	0	0	3
UNIT I	LINEAR STRUCTURES AND TREES					9
Introduction-Types-Linked Lists- Stack ADT – Queue ADT – Circular queue implementation – Applications of stack and queue- Tree ADT – Tree traversals– Binary Tree ADT – Expression trees						
UNIT II	ADVANCED TREES					9
Binary search tree ADT – AVL trees – Binary heaps – B trees-B+ trees – Applications of trees- Huffman Tree						
UNIT III	GRAPHS					9
Definitions – Topological sort – Breadth-first traversal – Shortest path algorithms –Minimum spanning tree – Prim's and Kruskal's algorithms – Depth first traversal –biconnectivity – Euler circuits – Applications of graphs: Travelling salesman Problem						
UNIT IV	HASHING AND SETS					9
Hashing – Separate chaining – Open addressing – Rehashing – Extendible hashing –Disjoint Set ADT – Dynamic equivalence problem – Smart union algorithms – Path compression						
UNIT V	SORTING AND SEARCHING					9
Introduction to Algorithm analysis: Asymptotic notation-Sorting:Bubble sort- Selection sort- Insertion sort- Shell sort- Heap sort- Quick sort- Merge sort – Searching: Linear search- Binary search.						

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 M. A. Weiss, “Data Structures and Algorithm Analysis in C”, Pearson Education, 8th Edition, 2007

REFERENCES

- 1 A. V. Aho, J. E. Hopcroft and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, 2nd Edition, 2007
- 2 A.M.Tenenbaum, Y. Langsam and M. J. Augenstein, “Data Structures using C”, Pearson Education, 1st Edition, 2003
- 3 Reema Thareja, “Data Structures Using C” Oxford Second Edition, 2014
- 4 Sahni Horowitz, “Fundamentals of Data Structures in C” ,Universities Press; Second edition 2008
- 5 Noel Kalicharan, “Datastructures in C”, Create Space Independent Publishing Platform; 1st edition 2008

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand and apply various data structures to solve computing problems
- CO2** Apply facts about trees in solving practical problems
- CO3** Solve problem based on non linear structures involving graphs
- CO4** Describe the hash function and concepts of collision and its resolution methods
- CO5** Choose the data structure that efficiently model the information in a problem

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	1		2	1			1		1	2	3	
CO2		1		2				2	2	1	2	2	2	1	2
CO3		2	2	3	1		2	1	1	3	3	1	1	2	
CO4	2				3	1			2	3		2		1	
CO5	3	2	1	1	3		2		1	3		1			1

19ITT202	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	J	C
	[Common to CSE & IT]	3	0	0	0	3

UNIT I BASIC STRUCTURE OF COMPUTERS 8

Functional units – Basic operational concepts – Bus Structures – Performance – Memory locations and addresses – Memory operations – Instruction and Instruction sequencing – Addressing modes – Assembly language – Case study : RISC and CISC Architecture.

UNIT II ARITHMETIC OPERATIONS 10

Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication- fast multiplication – Integer division – Floating point numbers and operations

UNIT III PROCESSOR AND PIPELINING 9

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.

UNIT IV MEMORY SYSTEM 8

Basic concepts of Semiconductor RAMs - ROMs – Speed, Size and Cost – Cache memories – Performance consideration – Virtual memory – Memory Management requirements – Secondary storage - Case Study: Memory Organization in Multiprocessors

UNIT V I/O ORGANIZATION AND PARALLELISM 10

Accessing I/O devices – Interrupts – Direct Memory Access – Buses–Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB) –Instruction Level Parallelism : Concepts and Challenges – Introduction to multicore processor – Graphics Processing Unit

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, McGraw-Hill, 5th Edition 2014.

REFERENCES

- 1 David A. Patterson and John L. Hennessey, “Computer organization and design”, MorganKauffman /Elsevier, 5th edition, 2014.
- 2 William Stallings, “Computer Organization and Architecture designing for Performance”, Pearson Education 8th Edition, 2010
- 3 John P.Hayes, “Computer Architecture and Organization”, McGraw Hill, 3rd Edition, 2002
- 4 M. Morris R. Mano “Computer System Architecture” 3rd Edition 2007
- 5 David A. Patterson “Computer Architecture: A Quantitative Approach”, Morgan Kaufmann; 5th edition 2011

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Illustrate the different addressing modes used in a processor
- CO2** Apply the knowledge of arithmetic operations
- CO3** Identify the control units present in a processor
- CO4** Analyze the performance of memory units present in a computer
- CO5** Demonstrate how parallel processor improves performance of a computer

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2											1	3	2	
CO2	3	2	1	2	2		2	2				2	3		
CO3		3	2		1		1					2	2	2	
CO4		3		2			1			1	2	2	3	1	2
CO5			3				3			2	2	2	2	2	3

19GET275	VQAR-I	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	2	0	0	0	2
UNIT I	QUANTITATIVE ABILITY I					8
Number theory- Shortcuts, Divisibility rule- Unit place deduction-LCM &HCF, Square root and Cube Root, Decimal & Fraction Percentage, Profit, loss and discount, Simple and compound interest, Ratio & Proportions, Mixtures & Allegation, Partnership.						
UNIT II	QUANTITATIVE ABILITY II					6
Problems on Ages, Average, Clocks, Calendar, Data Interpretation- Bar chart- Pie chart- Line chart- Tables chart.						
UNIT III	VERBAL REASONING I					7
Analytical reasoning– Linear and circular arrangement, Blood relation, Direction Problems, Puzzles. Logical reasoning - Number and Alpha series, Odd man out, Element series and Logical series, Coding and decoding, Analogy, Classification, Logical sequence of words.						
UNIT IV	LINGUISTICS SKILLS I					6
Parts of Speech- Noun, Verb, Participle, Articles, Pronoun, Preposition, Adverb, Conjunction. Logical sequence of words, Tense & Voice, Comparison.						
UNIT V	LINGUISTICS SKILLS II					3
Comprehension - Comprehend and understand a paragraph, Paragraph writing.						
		L :30	T: 0	P: 0	J: 0	T: 30 PERIODS

TEXT BOOKS

- 1 Rajesh Varma, “Fast Track Objective Arithmetic”, Arihant Publications.
- 2 M.K.Panday, “Analytical Reasoning”, Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to “Reasoning Verbal, Non-Verbal & Analytical”, Arihant Publications.
- 4 John Eastwood, “Oxford Practice Grammar”, Oxford.

REFERENCES

- 1 R.V.Praveen, “Quantitative Aptitude and Reasoning” PHI Publication.
- 2 R.S.Agarwal, “Quantitative Aptitude for Competitive Examinations”, S.Chand& Company Pvt Limited.
- 3 R.S.Agarwal, “A modern approach to Verbal & Non-verbal reasoning”, S.Chand & Company Pvt Limited.

COURSE OUTCOMES

At the end of the course students should be able to

- CO 1** Apply the number system for solving application orientated concepts in quantitative aptitude.
- CO 2** Apply the financial ability for solving application orientated concepts in quantitative aptitude and in the data interpretation techniques.
- CO 3** Analyze the analytical reasoning and logical reasoning in verbal aptitude applications.
- CO 4** Apply appropriate grammar in both speaking and writing.
- CO 5** Analyze the given content and write a creative content.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2				2	2	1	1			2	3		1
CO2	2	1	1				1	1			2		2		2
CO3	2	2		1			2		2			1	3	2	2
CO4	1							2		1			2	3	1
CO5								2		1			3	3	

UNIT I MINIMIZATION TECHNIQUES AND LOGIC GATES 10

Minimization Techniques: Number systems, Boolean postulates and laws – De-Morgan's Theorem – Principle of Duality – Boolean expression – Minimization of Boolean expressions — Minterm – Maxterm – Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don't care conditions. Tabulation method.

Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR Implementations of Logic Functions using gates, NAND-NOR implementations

UNIT II COMBINATIONAL CIRCUITS 9

Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Multiplexer/ Demultiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator.

UNIT III SEQUENTIAL CIRCUITS 9

Latches, Design thinking approach of Edge triggered Flip flops SR, JK, T, D and Master slave – Characteristic table and equation, Application table, Synchronous counters, Design of synchronous counters, up/down counter, Modulo-n counter, Decade counters.

UNIT IV DESIGN OF SEQUENTIAL CIRCUITS 9

Register, shift registers, Universal shift register, Ring counters, Classification of sequential circuits: Moore and Mealy, Design of synchronous sequential circuits, state diagram, State table, State minimization, State assignment, Introduction to Hazards: Static, Dynamic

UNIT V DIGITAL LOGIC FAMILIES AND PLD 8

Memories: ROM, PROM, EEPROM, RAM, Programmable Logic Devices: Programmable Logic Array (PLA), Programmable Array Logic (PAL), Implementation of combinational logic using PROM, PLA and PAL, Digital logic families: TTL, ECL and CMOS.

LAB COMPONENT**List of Experiments:**

1. Design and implementation of Adder and Subtractor using logic gates.
2. Design and implementation of code converters using logic gates
3. Design and implementation of 2 bit magnitude comparator.
4. Design and implementation of encoder and decoder.
5. Design and implementation of application using multiplexers/ demultiplexers.
6. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops.
7. Design and implementation of 3 bit synchronous and asynchronous counters.
8. Simulation of combinational circuits using Verilog Hardware Description Language.
9. Simulation of Sequential circuits using Verilog HDL.

L : 45 T: 0 P:30 J: 0 Total: 75 PERIODS

TEXT BOOKS

- 1 M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
- 2 John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.

REFERENCES

- 1 John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008
- 2 Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.
- 3 Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2006.
- 4 S.Salivahanan and S.Arivazhagan,—Digital Circuits and Design,Third Edition, Vikas Publishing House Pvt. Ltd, New Delhi,2007

- 5 Donald D.Givone, —Digital Principles and Designll, Tata Mc-Graw Hill Publishing company limited, New Delhi, 2002.

COURSE OUTCOMES

At the end of the course student should be able to:

CO1 Understand the different methods used for simplification of Boolean expressions.

CO2 Analyze the Combinational circuits.

CO3 Describe the Sequential building blocks & Memory elements.

CO4 Design a sequential circuit.

CO5 Classify the different memories and implement the digital circuits.

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2										2	2		3
CO2	2	3	3								1	1	3	2	2
CO3	3	3	2										3	2	3
CO4	2	2	3										3		2
CO5	3	2			2							2	3	2	3

LIST OF EXPERIMENTS

1. Array implementation of List ADT.
2. Array implementation of Stack and Queue ADTs.
3. Application of Stack ADT and Queue ADT.
Suggested Experiments:
 - Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, %, ^
 - Balancing Parenthesis
 - Solving Tower of Hanoi problem with **n** disks
 - Producer Consumer problem
 - Reader writer problem
4. Implement the following in Binary Search Tree
 - Insertion, Deletion
 - Finding Min Element and Max Element
 - Produce its pre-order, in-order, and post-order traversals
5. Implement a program to construct min or max heap to perform insertion and delete operations.
6. Implement a program to find shortest path in graph using Dijkstra's algorithm
7. Implement a program to find minimum cost spanning tree in graph using prim's algorithm
8. Implement a program to perform all the functions of a dictionary (ADT) using hashing
9. Implement a program for searching an element using Linear and Binary search.
10. Implement the following sorting methods to arrange a list of integers in ascending order:
 - Insertion sort
 - Bubble sort
11. Implement Heap sort algorithm for sorting a given list of integers in ascending order.
12. Implement the following sorting methods to arrange a list of integers in ascending order:
 - Quick sort
 - Merge sort
13. Banks often record transactions on an account, in order of the times of the transactions, but many people like to receive their bank statements with cheques listed in order by cheque number. People usually write(use) cheques in order by cheque number, and merchants usually cash them with reasonable dispatch. Thus few cheque numbers are usually out of order. Use an appropriate sorting algorithm for converting time of transaction ordering to cheque number ordering. Formulate the problem and write a C program to solve the problem by using appropriate data structures and algorithms.
14. A spell checker is a program that looks at a document and compares each word in the document to words stored in a dictionary. If it finds words in the dictionary, it moves on to the next word, If it does not find the word, it reports the user about the misspelled(possibly) word. Formulate the problem and write a C program to solve the problem by using appropriate data structures and algorithms.
1. A file manager identifies each file using an inode-no. A directory is also a file identified by an inode-no. Directory is a list of files each represented by an inode-no. The list has the header containing the inode-no of the parent that is the directory

itself. A separate table indexed by inode-no maintains attributes of files including the name of the file. Formulate the problem and write a C program to solve the problem by using appropriate data structures and algorithms.

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

Hardware

- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
- Printers – 3 Nos.

Software

- OS – Windows / UNIX Clone
- Compiler – C

L :0 T: 0 P: 30 J: 0 Total:30 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Design algorithms and employ appropriate advanced data structures for solving Problems efficiently
- CO2** Understand various data structure such as stacks, queues, trees, graphs, etc
- CO3** Implement various hashing techniques to avoid collision
- CO4** Implement various kinds of searching and sorting techniques, and know when to choose which technique
- CO5** Construct a suitable data structure and algorithm to solve a real world problem

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	1	2	2	1	1						1	3	3	1
CO2	3	2	3	1						1		1	3	1	
CO3	3	2	3	2	1	1					1		2	1	2
CO4	3	2	3	2	2	1	2	2	1			2	2	2	3
CO5	3	2	3	1						1		1	3	1	

UNIT I INTRODUCTION TO PYTHON**12**

Features of Python- Fundamentals of Python – Variables – Data Types

Suggested Experiments

1. Use interactive Shell to print the Hello Example : print 'Hello World'
2. Write a Python Program Using String Variable
3. Write a Python program to store data in list and then try to print them
4. Write a Python Program to display the following messages "Hello World, Python is High level, General-purpose Programming language"

UNIT II CONTROL FLOW & ARRAYS**12**

Conditional Statements – Iteration - List and Arrays

Suggested Experiments

1. Write a Python program to find SUM and MULTIPLICATION of any three numbers.
2. Write a Python program to find the average of any five numbers.
3. Write a Python program to find simple interest.
4. Scenario: A courier company has number of items to be delivered to its intended customers through its salesman. The salesman visits following cities to deliver the respective items:

S. NO.	CITIES	NO. OF ITEMS
1	Aligarh	18
2	Agra	25
3	Baroda	13
4	Banaras	43
5	Chennai	8
6	New Delhi	67
7	New Jalpaiguri	29
8	Howrah	11
9	Kolkata	56
10	Mumbai	33

Solve the following problems based on the above mentioned scenario using Python:

- a) Write a Python program to store and display the above mentioned cities and corresponding items using arrays.
- b) Write a Python program to display name of cities where salesman has delivered maximum and minimum number of items.
- c) Write a Python program to search the number of items to be delivered for a user
- d) Suppose the cover price of a book is Rs 240.95, but bookstores get a 40% discount. Shipping costs Rs 30 for the first copy and 75 cents for each additional copy. What is the total wholesale cost for 60 copies? Calculate using Python Code.

UNIT III CLASSES & FUNCTIONS**12**

Classes – Built-in Functions – Type Conversion – User Defined Functions – Flow of Execution

Suggested Experiments

Scenario: A university has different entities such as Department, Programs and Student whose data members and member functions are given below:

Teacher- { **Data Members:** Name, department, hours, programs Taught; **Member Function:** setDetails(), getDetails() }

Program- {**Data Members:** Name, department, duration; **Member Functions:** setDetails(), getDetails() }

Student- {**Data Members:** Name, RollNo, Program, Department; **Member Function:** setDetails(), getDetails() }

Solve the following problems based on the above mentioned scenario using Python:

1. Write a Python program to create Teacher, Program and Student Classes with above mentioned data members and member functions.
2. Add following functionalities in the above program, the default department of Teacher, Program and Student should be Computer Science, however a different department could be assigned at run time.
3. Write a Python program to overload “+” operator to add the hours of two teachers.
4. Write a Python program to create two subclasses Residential Student and Non Residential Student inherited from Student class. Residential Student would have a data member Hall of Residence and Non-Residential Student would have Address as its data member.

UNIT IV FILE HANDLING

12

Files and exception: text files, reading and writing files, handling exceptions

Suggested Experiments

1. Write a Python program to print number of days in a month.
2. Write a Python program to find the area of triangle
3. Write a Python program which takes a character as input from the keyboard and convert it into capital letter, if it is a small letter and Vice-Versa.
4. Write a Python program to find those numbers which are divisible by 7 and multiple of 5, between 1500 and 2700 (both included)
5. Write a Python program that asks the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user

UNIT V TEMPLATES

12

Function Template – Class Template – Infinite Recursion in Python

1. Write a function in Python to swap two numbers using function template. The numbers could be Integer or float that depends on the user inputs
2. Create a class Matrix with data members and member functions. Write a program in Python to perform Matrix operations (2-D array implementation), Add and Multiplication using class template
3. Write a Program Python to check whether the given number is Armstrong number or not
4. Write a Python Program to print factorial of a number
5. Write a Python Program to generate first n Fibonacci terms recursively
6. Write a Python Program to compute factorial of an integer n recursively

L:0 T:0 P:60 J:0 Total:60 PERIODS

Course Outcomes

At the end of the course the student should be able to :

- CO1** Write clear and effective python code
- CO2** Create applications using python programming
- CO3** Define Python functions and call them
- CO4** Use Python data structures — lists, tuples, dictionaries
- CO5** Understand the object oriented features using Python

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	3	3											3	
CO2	2	3	3											2	
CO3	2		2	3										2	2
CO4		2	3		3				2					2	2
CO5		2	2		2								2		

1. The scope of the project work is to enable the students in convenient groups (not more than 4 members) involving theoretical and experimental studies through Design Thinking approach.
2. The aim of the project work is to deepen comprehension of principles by applying them to a new problem based on the courses such as Transforms and Partial Differential Equations, Agile Software Engineering , Computer Organization and Architecture , Data Structures , Digital Electronics , Python Programming and Personality Development studied by the students in the second year of study but not limited to.
3. Project periods shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work as assigned by the guide and also to present the progress made in the project with periodical manner.
4. Creating a model/simulate the project using various tools / Implement the project by using languages. Analyze data, evaluate the results, conclude the appropriate solution and suggest for feature work.
5. The continuous assessment shall be made according to the regulation which is tabulated below.
6. The progress of the project is evaluated based on a minimum of two reviews.
7. The review committee may be constituted by the Head of the Department
8. Each student shall finally produce a comprehensive report covering Literature Survey, Empathy, Ideate, and Define, detailed work of project, Result, Conclusion and Future Work. This final report shall be typewritten form with specified guidelines.

L: 0 T: 0 P: 0 J: 30 TOTAL: 30 PERIODS

COURSE OUTCOMES

At the end of the course students should be able to

- CO1** Discover potential research areas in the field of IT
CO2 Compare and contrast the several existing solutions for research challenge
CO3 Demonstrate an ability to work in teams and manage the conduct of the research study
CO4 Formulate and propose a plan for creating a solution for the research plan identified
CO5 Prepare report on the application of emerging technologies in the selected industry.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3		3		2									3
CO2		3													
CO3			3						3		3		3		
CO4			3						3		3		3		
CO5												3			

19GEP275	PERSONALITY DEVELOPMENT	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	1	0	2	0	2
UNIT I	SELF-AWARENESS & PERSONAL DEVELOPMENT					3+6
Self-Awareness: Key Areas -Personality, Values, Habits, Needs & Emotions, Impact of Self Awareness on Personal Development.						
Personality –Definition, Elements, Determinants, Needs and Benefits, Personality traits.ersonality development skills, Positive traits for effective people, SWOT :Analysing Strength and weakness (SWOT), Building Esteem & Self-Confidence, Working on attitudes (aggressive, assertive, submissive), Self-Motivation						
UNIT II	BODY LANGUAGE					3+6
Body Language-Postures and Gestures, Personal Grooming, Personal Hygiene, Social Effectiveness, Business Etiquettes, Interpersonal Relationship						
UNIT III	COMMUNICATION AND LEADERSHIP					3+10
Communication: LRSW, Verbal & Non-Verbal Communication, Communication Barriers, Resume Building, Video Resume, Email writing, Presentation Skills, Self-Introduction, Extempore speech, Group Discussion, Mock Interview.						
Leadership: Leadership Styles, Leadership Traits, Group Dynamics, Team Building - Conflict management, Time Management, Stress management.						
UNIT IV	SOCIAL IMAGE TRAITS					3+6
Social etiquettes -Positive Social Image, Social Graces, Online Etiquettes, , Dinning Etiquettes, Public speaking, Voice Modulation, Telephone etiquettes, Interview etiquettes – Networking - Case Study and Company website References						
UNIT V	PERSONALITY TEST					3+2
Big Five Personality Test, Open DISC Assessment Test.						
		L :15	T: 0	P: 30	J: 0	T:45 PERIODS

TEXT BOOKS

- 1 Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
- 2 Stephen P. Robbins and Timothy A. Judge (2014), Organizational Behavior 16th Edition: Prentice Hall.

REFERENCES

- 1 Smith, B. Body Language. Delhi: Rohan Book Company. 2004
- 2 Personality Development and Career management: By R.M.Onkar (S Chand Publications)

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Evaluate the quality of personality for self-development in career perspective.
- CO2** Apply the body languages in his professional interview modes.

- CO3** Apply the communication and leadership styles in the public speaking.
CO4 Apply the social imaging qualities in their presentation skill.
CO5 Demonstrate the personality development in mock interview.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1			2		3		2			3			2		
CO2					2					3		3		2	
CO3					2		2		3	3		3	2		
CO4										3					
CO5							2			3		3			

SEMESTER IV

19MAT204	PROBABILITY AND STATISTICS	L	T	P	J	C
	(Common to CSE, IT,BME)	3	0	0	0	3
UNIT I	PROBABILITY AND RANDOM VARIABLE					9
Axioms of probability - Conditional probability - Total probability - Baye's theorem- Discrete and continuous random variables – Moments – Moment generating functions and their properties.						
UNIT II	STANDARD DISTRIBUTIONS					9
Binomial – Poisson – Uniform – Exponential – Normal distributions and their properties.						
UNIT III	TWO DIMENSIONAL RANDOM VARIABLES					9
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression.						
UNIT IV	TESTING OF HYPOTHESIS					9
Sampling distributions – Statistical hypothesis – Tests for single mean, proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit-Independence of attributes.						
UNIT V	DESIGN OF EXPERIMENTS					9
Completely randomized design – Randomized block design – Latin square design.						
		L : 45	T: 0	P: 0	J: 0	Total: 45 PERIODS

TEXT BOOKS

1. Ibe, O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2016.
2. Papoulis, A and Unnikrishnapillai, S., "Probability, Random Variables and Stochastic Processes" McGraw Hill Education India, 4th Edition, New Delhi, 2010.

REFERENCES

1. Allen, A.O., "Probability, Statistics and Queueing Theory with Computer Applications", Elsevier, 2nd edition, 2011.
2. Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", PHI Learning Private limited, New Delhi, 2011.
3. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 3rd Edition, Elsevier, 2004.
4. Spiegel, M.R., Schiller, J and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.
5. Johnson, R.A., Miller, I and Freund, J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Apply the fundamental knowledge of the Probability concepts in real world.
- CO2** Utilize the skills in handling more than one random variable, standard distributions and functions of random variables.
- CO3** Discern the bivariate distributions and know how to calculate basic two- variable statistics (covariance, correlation).
- CO4** Apply the statistical concepts and tools for engineering applications and to use different types of research methodology techniques for decision making under uncertainty.
- CO5** Perform the ANOVA calculation which is needed for engineering research and project management.

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	2	2					2			3			
CO2	3	3	2	2					2			3			
CO3	3	3	2	2					2			3			
CO4	3	3	2	2	2				2		1	3			
CO5	3	3	2	2	2				2		2	3			

UNIT I INTRODUCTION

Purpose of Database System -- Views of data – Data models, Database Management system - Three-schema architecture of DBMS, Components of DBMS. Entity –Relationship Model - Conceptual data modeling - motivation, entities, entity types, attributes, relationships, relationship types, E/R diagram notations, Examples

UNIT II RELATIONAL MODEL

Relational Data Model - keys, referential integrity and foreign keys, Relational Algebra - SQL fundamentals- Introduction, data definition in SQL, table, key and foreign key definitions, update behaviors-Intermediate SQL-Advanced SQL features -Embedded SQL- Dynamic SQL, CASE Studies-Oracle:Database Design and Querying Tools; SQL Variations and Extensions

UNIT III DATABASE DESIGN

Dependencies and Normal forms - Functional Dependencies, Armstrong's axioms for FD's, closure of a set of FD's, minimal covers-Non- loss decomposition-First,Second,Third Normal Forms, Dependency Preservation-Boyce/Codd Normal Form-Multivalued Dependencies and Fourth Normal Form- Join Dependencies and Fifth Normal Form

UNIT IV TRANSACTIONS

Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery – Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.

UNIT V PHYSICAL STORAGE AND MONGODB

Data Storage and Indexes – RAID- File organization-Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing. Query Processing Overview. MongoDB-Installing and Set up, Database creation and manipulation, Indexing and ordering. CASE Studies- Oracle,DB2: Storage and Indexing

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System Concepts, Sixth Edition, Tata McGraw Hill, 2011.
2. RamezElmasri, Shamkant B. Navathe, —Fundamentals of Database Systems, Sixth Edition, Pearson Education, 2011.

REFERENCES

- 1 C.J.Date, A.Kannan, S.Swamynathan, —An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.
- 2 Raghu Ramakrishnan, —Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.
- 3 G.K.Gupta, "Database Management Systems, Tata McGraw Hill, 2011.
- 4 S.K.Singh, "Database Systems Concepts, Design and Applications", First Edition, Pearson Education, 2009.(Unit I,II,V)

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand basic database concepts and its structures with logical designing using E R model.
- CO2** Design a relational database schema and be able to write SQL queries for the application.
- CO3** Apply various Normalization techniques to perform good database design.
- CO4** Examine the transaction processing and locking using concurrency control concepts
- CO5** Analyze the basic database storage structures and implementation techniques with the MongoDB.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2		2								3	3	2		1
CO2	2	2	2		2						2	3	2	2	3
CO3	1	2	2	2		3	2			2		2	2	2	3
CO4	1	2	2	2	2						3	2	2	2	
CO5	3	3			1	3	1		3	1	3	1	3	3	

UNIT I INTRODUCTION**6**

Big Data and Data Science, A Project on Data Analytics - A Little History on Methodologies for Data Analytics, KDD Process, CRISP-DM Methodology; Data Analytics- Types, Tools and Applications

UNIT II GETTING INSIGHTS FROM DATA, DATA QUALITY AND PREPROCESSING**6**

Descriptive Statistics - Scale Types, Descriptive Univariate Analysis, Descriptive Bivariate Analysis; Descriptive Multivariate Analysis - Multivariate Frequencies, Multivariate Data Visualization, Multivariate Statistics, Infographics and Word Clouds; Data Quality - Missing Values, Redundant Data, Inconsistent Data, Noisy Data, Outliers.

UNIT III CLUSTERING**6**

Distance Measures - Differences between Values of Common Attribute Types, Distance Measures for Objects with Quantitative Attributes, Distance Measures for Non-conventional Attributes; Clustering Validation, Clustering Techniques - K-means, Centroids and Distance Measures, DBSCAN.

UNIT IV CLASSIFICATION**6**

Binary Classification - Predictive Performance Measures for Classification; Distance-based Learning Algorithms - K-nearest Neighbor Algorithms, Case-based Reasoning; Probabilistic Classification Algorithms - Logistic Regression Algorithm, Naive Bayes Algorithm.

UNIT V REGRESSION AND APPLICATIONS**6**

Regression and its types; DA Applications for Text, Web and Social Media - Working with Texts, Recommender Systems, Social Network Analysis

L : 30 T: 0 P: 0 J: 0 Total: 30 PERIODS**TEXT BOOKS**

- 1 Joao Moreira, Andre Carvalho, Tomás Horvath – “A General Introduction to Data Analytics” – Wiley - 2018

REFERENCES

- 1 Dean J, —Big Data, Data Mining and Machine learning, Wiley publications, 2014.
- 2 Provost F and Fawcett T, —Data Science for Business, O'Reilly Media Inc, 2013.
- 3 Janert PK, —Data Analysis with Open Source Tools, O'Reilly Media Inc, 2011.
- 4 Weiss SM, Indurkha N and Zhang T, —Fundamentals of Predictive Text Mining, Springer-Verlag London Limited, 2010.
- 5 Runkler T A, - Data Analytics: Models and Algorithms for Intelligent data analysis, Springer, 2012

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Exposed to the basics of Data Science, Big Data, Data Analytics, Data and its Relations.
- CO2** Familiar in getting insights from data and preprocessing techniques by using data sets.
- CO3** Perform the various classification methods.
- CO4** Implement the different clustering techniques.
- CO5** Understand the basics of Regression and Experiments DA Applications for Text, Web and Social Media.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	2							2				2	2
CO2				2	2								3		
CO3			2		2										
CO4				3									2		
CO5			3	2			2				2			2	2

UNIT I 8085 AND 8086 MICROPROCESSOR 9

Introduction to 8085 Architecture- Instruction Set and Assembly Language programming.

Introduction to 8086 Architecture, I/O & Memory Interfacing, Addressing Modes, Instruction Formats, Instruction Set, Assembler Directives, Interrupts, Assembly Language Programming.

UNIT II I/O INTERFACING 9

Memory Interfacing and I/O interfacing – Parallel communication interface – Serial communication interface – D/A and A/D Interface – Timer – Keyboard /display controller – Interrupt controller –DMA controller – Programming and applications .Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

UNIT III 8051 MICROCONTROLLER 9

Architecture of 8051, Special Function Registers (SFRs), I/O Pins Ports and Circuits, Instruction set, Interrupts, Assembly language programming.

UNIT IV INTERFACING MICROCONTROLLER 9

Programming 8051 Timers – Serial Port Programming – Interrupts Programming – LCD & Keyboard Interfacing – ADC, DAC & Sensor Interfacing – External Memory Interface- Stepper Motor and Waveform generation – Comparison of Microprocessor and Microcontroller.

UNIT V MICROCONTROLLER APPLICATIONS & ADVANCED PROCESSOR 9

Temperature Control System, Motor Speed Control System, Traffic light System, Elevator System, Data Acquisitions System.

Introduction to Architecture of PIC Microcontroller, ARM Processor, ATMEGA Processor.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Yu-Cheng Liu, Glenn A.Gibson, —Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Designl, Second Edition, Prentice Hall of India, 2007.
2. Mohamed Ali Mazidi, Janice GillispieMazidi, RolinMcKinlay, —The 8051 Microcontroller and Embedded Systems: Using Assembly and Cl, Second Edition, Pearson education, 2011.

REFERENCES

- 1 Ramesh S Gaonkar, Microprocessor Architecture, Programming and application with 8085, 6th Edition, Penram International Publishing.
- 2 A.K.Ray,K.M.Bhurchandi, Advanced Microprocessors and Peripherals —3rd edition, Tata McGrawHill,2012.
- 3 Kenneth J Ayala, The 8051 Microcontroller Architecture Programming and Application, third Edition, Penram International Publishers.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the architecture of 8086 microprocessor.
- CO2** Know the interfacing of microprocessors with supporting chips.
- CO3** Familiarize the architecture of 8051 microcontroller and able to write the assembly language programmes.
- CO4** Apply and understand the interfacing of different devices to the microcontroller.
- CO5** Analyze a various applications of microcontrollers and study the advanced processors.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3		1									1	1	2	
CO2	3	2	3		2							2		2	
CO3	3	2	3		2							2		2	
CO4	2	3	2											2	
CO5	2	1	3									3		2	

UNIT I QUANTITATIVE ABILITY III**6**

Time, speed & distance-Average speed- Relative speed- Train problems- Boats and streams- Races, Chain rule, Time and work -Pipes and cisterns

UNIT II QUANTITATIVE ABILITY IV**4**

Permutation & Combination, Probability, Mensuration

UNIT III VERBAL REASONING II**7**

Machine Input and Output, Coded Inequalities, syllogisms, Problems on Cubes, Data sufficiency.

Critical Reasoning -Statement and Argument, Statement and Assumption, Statement and Conclusion, Cause and effect, Course of action.

UNIT IV NON- VERBAL REASONING**5**

Figure series, Odd man out, Mirror Image, Water image, Embedded Image, Cubes and Dices, Insert the Missing Characters, Analytical reasoning.

UNIT V LINGUISTICS SKILLS III**8**

Sentences - Simple, Compound, Complex & Mixed sentences, Sentence Rearrangement, Idioms & Phrases, Reading Comprehension at higher level, Word Substitution, Synonyms & Antonyms, Error Spotting.

L :30 T: 0 P: 0 J: 0 T: 30 PERIODS**TEXT BOOKS**

- 1 Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.
- 2 M.K.Panday, "Analytical Reasoning", Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 S.P.Bakshi, "Objective English" Arihant Publications.

REFERENCES

- 1 R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
- 2 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand& Company Pvt Limited.
- 3 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Learn the time and distance for solving application orientated concepts in quantitative aptitude
- CO2** Apply the financial ability for solving application orientated concepts in quantitative aptitude
- CO3** Analyze the verbal reasoning and the critical reasoning in quantitative aptitude.
- CO4** Analyze the non-verbal reasoning in verbal aptitude applications
- CO5** Apply appropriate LSRW skills

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	2									3		3
CO2	3	3	2	2									2		3
CO3	3	3	3	2	2								3	2	3
CO4	3	3	2	2									2	2	3
CO5	3	3	2									2	3		3

UNIT I INTRODUCTION**3+6**

Importance of Hindi Language- Devanagari Alphabet (Read/Write) – Numbers (Read & Write) - Vowels & their abbreviated forms-consonants-Conjuncts- Parts of speech- Gender

UNIT II WORDS 3+6

Pronoun-Adjective-Verb-Tenses-Voice- Secondary verbs- Indeclinable- Cardinal numerals- Daily life words

UNIT III CLASSIFIED SENTENCES**3+6**

Expressions- Useful Expressions- Imperative sentences-Past tense- Present tense-Future tense- Interrogative sentences and negative sentences

UNIT IV SITUATIONAL SENTENCES**3+6**

Situational Sentences: At home-Shopping- Craftsman-Food & Drink- Hotel & Restaurant- Post office/Telephone/Bank- While Travelling- Health & Hygiene- Weather-Time.

UNIT V CONVERSATION**3+6**

Conversation between friends- About money- On the bus- Asking the way- Making a Trunk Call- About a Trips- The villager and the urban- The doctor & the patient- Self Introduction

EXERCISES PROCEDURE FOR PRACTICALS		
Exercises	Assessment (Mandatory)	
	Based on Report Submission	Based on Exercises/Presentation
Alphabets –Read & Write	5	5
Numbers-Read & Write	5	5
Vowels-Read & Write	5	5
Consonant Conjuncts		10
Parts of Speech & Gender		10
Verbs, tenses & Daily Life words		10
Verbs, tenses & Daily Life words		10
Tenses-Past Present & Future		10
Interrogative & negativesentences		10
Conversation practices 1 (Different cases to different batch)		10
Conversation practices 2 (Different cases to differentbatch)		10
Conversation practices 3 (Different cases to different batch)		10

L :15 T: 0 P: 30 J: 0 T: 45 PERIODS

REFERENCE BOOKS

- 1 Hindi for beginners by Sunita Narain mathur “ Tuttle Publisher”
- 2 Learn hindi through English in 30 Days by Krishna gopal vikal “ Diamond Pocket books”

COURSE OUTCOMES

At the end of the course students should be able to

- CO1** Know about the language Hindi and parts of speech
- CO2** Understand the verbs and tenses of Hindi language
- CO3** Experience the expression and classified sentences in Hindi Language.
- CO4** Practice the Hindi speaking at suitable situations.
- CO5** Converse in Hindi with your friends & neighbors.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1		2		2					2	3					
CO2		2		2					2	3					
CO3		2		2					2	3					
CO4		2		2					2	3					
CO5		2		2					2	3					

UNIT I SELF INTRODUCTION AND BASIC CONVERSATION, JAPANESE SCRIPTS AND NUMBERS 3+6

Introduction to Japanese Syllables (phonetic alphabet), greetings & Self-introduction, Identifying things, point objects and listening to their names, Listen to things and places etc. Creating shopping lists. Numbers. Three Different types of Japanese Scripts : Hiragana, Katakana, Kanji.

UNIT II TIME, DAY, MONTH AND YEARS, TRAVEL , WORK ENVIRONMENT, PARTICLES 3+6

Introduction to Time, day of the week, simple inquiries on telephone, Means of transport, Basic conversations of everyday life., Office Environment, Japanese Particles

UNIT III LOCATION AND OBJECTS ALONG WITH EXPRESSIONS , PRESENT / PAST FORMS 3+6

Frame questions in Japanese. Vocabulary of giving and receiving objects, Stating impressions/things surrounding us, Expressing likes and dislikes, good/bad, possessions, Talking about the country, town and the environment

UNIT IV COUNTERS , DIRECTIONS, COLORS, FAMILY & RELATIONSHIP 3+6

Quantity, number of people, time, period etc., Stating thoughts and impressions, Conveying movement (e.g. go / come). Colors, Family and Relationship.

UNIT V BASIC AND DAY TO DAY CONVERSATIONS WITH MULTIPLE SCENARIOS 3+6

Conversational practices: Between Friends, Customer and Seller, & Business Conversation.

L :15 T: 0 P: 30 J: 0 T: 45 PERIODS

REFERENCE BOOKS

1. MINNA NO NIHONGO 1-1 Translation & Grammatical notes in English elementary
2. SHIN NIHONGO NO KISO 1 (Grammatical Notes in English)

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Know about the language Japanese and parts of speech
- CO2** Understand the Japanese language on time and travel
- CO3** Experience the Conversation about location and expression.
- CO4** Practice Conversation about family and relationship
- CO5** Converse in Japanese in day to day conversations

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1		2		2					2	3					
CO2		2		2					2	3					
CO3		2		2					2	3					
CO4		2		2					2	3					
CO5		2		2					2	3					

UNIT I INTRODUCTION**8**

Introduction to German Language- Alphabets-Greetings and goodbye - Introduce yourself and others - numbers -how to give your telephone number and email address -Speak about countries- languages - words.-Vowels-Read & Write-Tenses.

UNIT II CONVERSATIONS WITH FRIENDS COLLEAGUE**6**

Speaking about hobbies - fixing meetings and appointments - name days of the week - about work. Speak about Professions and working hours

UNIT III CONVERSATION ABOUT CITY**7**

Name places and buildings - Ask questions about places - Assigning texts to a picture story - Enquire about things - Name means of transport - ask for directions and describe a way -understand texts with international words - learn articles

UNIT IV CONVERSATION ABOUT FOOD AND SHOPPING**6**

Speak about food - plan for shopping - conversations while shopping - conversations while eating - Understand texts with W questions -Organize and learn words

UNIT V CONVERSATION ABOUT TIME WITH FRIENDS**3**

Understanding and saying the time -Specify times - to talk about family -To plan something together n to talk about birthdays - Understand and write an invitation -to Order and pay in the restaurant n to talk about an event

EXERCISES PROCEDURE FOR PRACTICALS

S.No	Exercises	Assessment (Mandatory)	
		Based on Report Submission	Based on Exercises/Presentation
1	Alphabets –Read & Write	5	5
2	Numbers-Read & Write	5	5
3	Vowels-Read & Write	5	5
4	Consonant Conjuncts		10
5	Parts of Speech & Gender		10
6	Verbs, tenses & Daily Life words		10
7	Verbs, tenses & Daily Life words		10
8	Tenses-Past Present & Future		10
9	Interrogative & negative sentences		10

10	Conversation practices 1 (Different cases to different batch)		10
11	Conversation practices 2 (Different cases to different batch)		10
12	Conversation practices 3 (Different cases to different batch)		10

L :15 T: 0 P: 30 J: 0 T: 45 PERIODS

TEXT BOOKS

- 1 Netzwerk Deutsch als fremdsprache A1.1 Kursbuch
- 2 Netzwerk Deutsch als fremdsprache A1.1 Arbeitsbuch

COURSE OUTCOMES

At the end of the course students should be able to

CO1 Know about the language German and parts of speech

CO2 Understand the Conversations with Friends Colleagues

CO3 Experience the Conversation about city

CO4 Practice Conversation about food and shopping

CO5 Converse in German about time with friends

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1		2		2					2	3					
CO2		2		2					2	3					
CO3		2		2					2	3					
CO4		2		2					2	3					
CO5		2		2					2	3					

UNIT I INTRODUCTION**3+6**

Introduction to the French Language- Alphabets -Consonants-Greetings and goodbye –Daily life words- Introduce yourself and others - numbers -how to give your telephone number and email address -Speak about countries- languages - words.-Vowels-Read & Write-Tenses

UNITII CONVERSATIONS WITH FRIENDS COLLEAGUES**3+6**

Speaking about hobbies - fixing meetings and appointments - name days of the week - about work. Speak about Professions and working hours

UNIT III CONVERSATION ABOUT CITY**3+6**

Name places and buildings - Ask questions about places - Assigning texts to a picture story - Enquire about things - Name means of transport - ask for directions and describe a way -understand texts with international words - learn articles

UNIT IV CONVERSATION ABOUT FOOD AND SHOPPING**3+6**

Speak about food - plan for shopping - conversations while shopping - conversations while eating - Understand texts with W questions -Organize and learn words.

UNIT V CONVERSATION ABOUT TIME WITH FRIENDS**3 +6**

Understanding and saying the time -Specify times - to talk about family -To plan something together n to talk about birthdays - Understand and write an invitation -to Order and pay in the restaurant n to talk about an event.

EXERCISES PROCEDURE FOR PRACTICALS			
S.No	Exercises	Assignment (Mandatory)	
		Based on Report Submission	Based on Exercises/Presentation
1	Alphabets –Read & Write	5	5
2	Numbers-Read & Write	5	5
3	Vowels-Read & Write	5	5
4	Consonant Conjuncts		10
5	Parts of Speech & Gender		10
6	Verbs, tenses & Daily Life words		10
7	Verbs, tenses & Daily Life words		10
8	Tenses-Past Present & Future		10

9	Interrogative & negative sentences		10
10	Conversation practices 1 (Different cases to different batch)		10
11	Conversation practices 2 (Different cases to different batch)		10
12	Conversation practices 3 (Different cases to different batch)		10

L: 15 T: 0 P: 30 J: 0 T: 45 PERIODS

REFERENCE BOOKS

1. G. Mauger Cours DE Languet De Civilisation Francaises
2. Annie Heminway, Complete French all in one Premium Second Edition, Tata McGraw Hill Education.
3. Diamond French-Aprenons Le Francois New Saraswathi House (India)Private Limited
4. A. Monnerie Beinvenue En France. Documentation Marrie Franchoise Boulet

COURSE OUTCOMES

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

CO1: Know about the French language and parts of speech.

CO2: Understand the Conversations with Friends Colleagues

CO3: Experience the Conversation about the city

CO4: Practice Conversation about food and shopping.

CO5: Converse in French about time with friends

CO/PO Mapping (S/M/W indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs) / Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1		2		2					2	3					
CO2		2		2					2	3					
CO3		2		2					2	3					
CO4		2		2					2	3					
CO5		2		2					2	3					

UNIT I OVERVIEW AND PROCESS MANAGEMENT**9+6**

Introduction: Computer System Organization, Architecture, Operation, Process Management – Memory Management – Storage Management – Operating System – Process concept – Process scheduling – Operations on processes – Cooperating processes – Inter process communication.

Threads: Multi-threading Models – Threading issues.

Lab Practice:

- Basic UNIX Commands and system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir, open, read, write
- Simple Shell program - Conditional Statements - Testing and Loops
- Develop Application using Inter Process communication (using shared memory, pipes or message queues)

UNIT II PROCESS SCHEDULING AND SYNCHRONIZATION**9+6**

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation.

Process Synchronization: The critical-section problem – Synchronization hardware – Semaphores – Classical problems of synchronization.

Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock.

Lab Practice:

- Print Gantt chart for FCFS, SJF, Priority & Round Robin for a set of process compute and print the average waiting time and average turnaround time for a given set of processes
- Implement Producer – Consumer problem using semaphores
- Simulate an Algorithm for Dead Lock Detection.

UNIT III STORAGE MANAGEMENT**9+6**

Memory Management: Background – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging.

Virtual Memory: Background – Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing.

Lab Practice:

- Implement memory management schemes

UNIT IV FILE SYSTEMS**9+6**

File concept: Access methods – Directory structure – Files System Mounting – File Sharing – Protection. File System Implementation: Directory implementation – Allocation methods – Free-space management.

Lab Practice:

- Implement any one file allocation technique (Linked, Indexed or Contiguous)

UNIT V I/O SYSTEMS**9+6**

I/O Systems: I/O Hardware – Application I/O interface – Kernel I/O subsystem – Streams – performance.

Mass-Storage Structure: Disk scheduling – Disk management – Swap-space management – RAID – disk attachment – stable storage – tertiary storage. Case study: I/O in Linux.

Lab Practice:

- Given an array of disk track numbers and initial head position using FCFS, C-SCAN, SSTF find the total number of seek operations done to access all the requested tracks

L : 45 T: 0 P: 30 J: 0 Total: 75 PERIODS**TEXT BOOKS**

- 1 Silberschatz, Galvin, and Gagne, “Operating System Concepts”, Ninth Edition, Wiley India Pvt Ltd, 2009.
- 2 Andrew S. Tanenbaum, “Modern Operating Systems”, Fourth Edition, Pearson Education, 2010.

REFERENCES

- 1 Gary Nutt, “Operating Systems”, Third Edition, Pearson Education, 2004.
- 2 Harvey M. Deitel, “Operating Systems”, Third Edition, Pearson Education, 2004.
- 3 Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley and Sons Inc., 2012.
- 4 William Stallings, “Operating Systems – Internals and Design Principles”, 7th Edition, Prentice Hall, 2011.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know the difference between various types of operating systems, analyze various process management concepts and basic UNIX commands.
- CO2** Learn concepts in scheduling, synchronization and deadlocks.
- CO3** Understand the different memory management schemes in OS..
- CO4** Know the issues related to file system interface and directory implementation.
- CO5** Familiar with types of I/O management, disk scheduling.

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2		2								2	3	2	
CO2	2	2	3	2	1				1				3	2	
CO3		3		3		2					3	2		2	2
CO4	1	3		2		2					2	1	3		
CO5		2	2	2		3			2		2	1		2	2

19ITB201	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	J	C
	[Common to CSE & IT]	3	0	2	0	4
UNIT I	INTRODUCTION					9+6
Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Nonrecursive algorithms.						
Lab component:						
1. Implement GCD using Euclidian algorithm						
2. Implement Towers of Hanoi problem and analyze it						
UNIT II	BRUTE FORCE AND DIVIDE & CONQUER					9+6
Brute Force: Selection sort, Bubble Sort, Sequential Search, Closest-Pair and Convex-Hull Problems-Traveling Salesman Problem – Knapsack Problem - Assignment problem. Divide and conquer methodology: Merge sort – Quick sort – Binary search – Multiplication of Large Integers – Strassen's Matrix Multiplication						
Lab component:						
1. Find the sorting mechanism which uses the pivot value as the key component to sort all the values. Write algorithm and derive the time complexity. Sort the following using the same method: 45, 67, 12, 34, 09						
2. Find the sorting mechanism which exactly divides the given problem into two proper subsets during the iteration. Write the algorithm and derive the time complexity. Sort the following using the same method. 45, 67, 12, 34, 09						
3. Design an algorithm which always reduces the searching process by half based on the root node value in the constructed tree. Write the algorithm and time complexity. Construct the tree for applying the above algorithm using the same properties: 55, 63, 31, 17, 22, 40, 67, 83						
UNIT III	DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE					9+6
Dynamic Programming: Computing a Binomial Coefficient – Warshall's and Floyd's algorithm – Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique Prim's algorithm- Kruskal's Algorithm - Dijkstra's Algorithm-Huffman Trees – Job Sequence Scheduling						
Lab Component:						
1. Design an algorithm which should give an optimal solution always in finding minimum spanning tree. Write an algorithm and time complexity.						
2. User wants to send his data in secured manner from one place to another place through communication channel. His encoding mechanism should support variable length encoding mechanism. Design an algorithm for this situation to solve the user problem and write the time complexity.						
3. User wants to find shortest path between all the vertices. Give solution to the user using dynamic programming methodology, Write an algorithm and time complexity.						
UNIT IV	FLOW NETWORKS AND STRING MATCHING					9+6
Flow Networks-Ford Fulkerson Method-String Matching-Naive String Matching Algorithm-Knuth Morris Pratt Algorithm-Analysis						
Lab Component						
1. Implement Naive String Matching Algorithm						
2. Implement ford Fulkerson algorithm						
UNIT V	BACKTRACKING AND BRANCH & BOUND					9+6
Limitations of Algorithm - Lower-Bound Arguments-Decision Trees-P, NP and NP-Complete Problems – Coping with the Limitations – Backtracking: n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem-Branch and Bound: Assignment problem – Knapsack Problem – Traveling Salesman Problem- Approximation Algorithms for NP Hard Problems						

Lab Component

1. Implement knapsack problem using branch and bound.
2. Implement any scheme to find the optimal solution for the Traveling Sales Person problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.
3. Design and implement in Java to find a subset of a given set $S = \{S_1, S_2, \dots, S_n\}$ of n positive integers whose SUM is equal to a given positive integer d . For example, if $S = \{1, 2, 5, 6, 8\}$ and $d = 9$, there are two solutions $\{1, 2, 6\}$ and $\{1, 8\}$. Display a suitable message, if the given problem instance doesn't have a solution.

L : 45 T: 0 P:30 J: 0 Total: 75 PERIODS

TEXT BOOKS

- 1 Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Education, 3rd Edition, 2014.
- 2 Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", PHI Learning Private Limited, 3rd Edition, 2012.

REFERENCES

- 1 Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", PHI Learning Private Limited, 3rd Edition, 2012.
- 2 Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, 2nd Edition, 2007.
- 3 Donald E. Knuth, "The Art of Computer Programming", Pearson Education, 2nd Edition, 2009
- 4 Steven S. Skiena, "The Algorithm Design Manual", Springer, 2nd Edition, 2008
- 5 Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", PHI Learning Private Limited, 3rd Edition, 2012.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Demonstrate how the worst-case time complexity of an algorithm is defined
- CO2** Compare the efficiency of algorithms using asymptotic complexity
- CO3** Design efficient algorithms using standard algorithm design techniques
- CO4** Analysis real time problems with efficient methodology
- CO5** Compare different solutions for the problems and identify suitable methodology based on the environment

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs) // Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	1	1	3			1						3	1	
CO2		3										2		2	
CO3		3				2									2
CO4	2					3								1	
CO5					2						3			2	

LIST OF EXPERIMENTS

1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3. Creation of Views, Synonyms, Sequence, Indexes, Save point.
4. Creating an Employee database to set various constraints.
5. Creating relationship between the databases.
6. Study of PL/SQL block.
7. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
8. Write a PL/SQL block that handles all types of exceptions.
9. Creation of Procedures.
10. Creation of database triggers and functions
11. Installing and Configuring - MongoDB
12. Creation, Insertion, Updation, Retrieval and Deletion operations on Mongo DB
13. Accessing Databases from Programs using JDBC
14. Mini project (Application Development using Oracle/ Mysql)

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS**Hardware**

- Internet connection (DSL, LAN, or cable connection desirable) – 33 Nos.
- Printers – 3 Nos.

Software

- OS – Windows
- MYSQL/Oracle

L: 0 T:0 P:30 J:0 TOTAL:30 PERIODS**COURSE OUTCOMES**

At the end of the course student should be able to:

- CO1** Apply the basic concepts of Database Systems and Applications.
- CO2** Use the basics of SQL and construct queries using SQL in database creation and manipulation.
- CO3** Experiment the PL/SQL program for various applications with Triggers.
- CO4** Demonstrate the installation and configuration of MongoDB with creation and implementation queries.
- CO5** Develop the application using database connectivity.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	3											2	3	
CO2				3		2								2	
CO3	1			2									2		
CO4	2	2	2	2	3	1	2				2	3	2	3	
CO5	3	2		2									3	3	

GOALS AND OBJECTIVES

1. Design Thinking/Problem Solving: Exercise sound reasoning to analyze issues, make decisions, and overcome problems. The individual is able to obtain, interpret, and use knowledge, facts, and data in this process, and may demonstrate originality and inventiveness.
2. Teamwork/Collaboration: Build collaborative relationships with colleagues and customers representing diverse cultures, races, ages, genders, religions, lifestyles, and viewpoints. The individual is able to work within a team structure, and can negotiate and manage conflict.
3. Digital Technology: Leverage existing digital technologies ethically and efficiently to solve problems, complete tasks, and accomplish goals. The individual demonstrates effective adaptability to new and emerging technologies.
4. Leadership: Leverage the strengths of others to achieve common goals, and use interpersonal skills to coach and develop others. The individual is able to assess and manage his/her emotions and those of others; use empathetic skills to guide and motivate; and organize, prioritize, and delegate work.
5. Professionalism/Work Ethic: Demonstrate personal accountability and effective work habits, e.g., punctuality, working productively with others, and time workload management, and understand the impact of non-verbal communication on professional work image. The individual demonstrates integrity and ethical behavior, acts responsibly with the interests of the larger community in mind, and is able to learn from his/her mistakes.
6. Global/Intercultural Fluency: Value, respect, and learn from diverse cultures, races, ages, genders, sexual orientations, and religions. The individual demonstrates openness, inclusiveness, sensitivity, and the ability to interact respectfully with all people and understand individuals' differences.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Demonstrate content knowledge appropriate to job assignment.
- CO2** Exhibit evidence of increased content knowledge gained through practical experience.
- CO3** Describe the nature and function of the organization in which the internship experience takes place.
- CO4** Elaborate on how the internship placement site fits into their broader career field.
- CO5** Evaluate the internship experience in terms of their personal, educational and career needs

CO/PO Mapping

(S/M/W indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2					2					3		1		
CO2			2	1							3	1			
CO3									1	1					
CO4												2		1	
CO5						2					3				1

SEMESTER V

19MAT301	DISCRETE MATHEMATICS	L	T	P	J	C
	(Common to all B.E. CSE / B. Tech. Courses)	3	0	0	0	3
UNIT I	LOGIC AND PROOFS					9
Propositional Logic – Propositional equivalences – Predicates and Quantifiers – Nested Quantifiers – Rules of inference – Introduction to proofs – Proof methods and strategy.						
UNIT II	COMBINATORICS					9
Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.						
UNIT III	GRAPHS					9
Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.						
UNIT IV	ALGEBRAIC STRUCTURES					9
Algebraic systems – Semi groups and monoids – Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem.						
UNIT V	LATTICES AND BOOLEAN ALGEBRA					9
Partial ordering – Posets – Lattices as posets – Properties of lattices – Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra.						
		L : 45	T:0	P: 0	J: 0	Total: 45 PERIODS

TEXT BOOKS

1. Rosen.K.H, "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
2. Tremblay J.P. and Manohar, R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCES

1. Grimaldi.R.P., "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2014.
2. Lipschutz.S and Mark Lipson, "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Revised 3rd Edition, 2017
3. Koshy.T, "Discrete Mathematics with Applications", Elsevier Publications, 2006.
4. Balakrishnan, V.K., "Introductory Discrete Mathematics", Dover Publications Inc, New York, 2010.
5. Narsingh Deo, Graph theory with Application to Engineering and computer science, Prentice Hall India, First Edition, 2016.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Apply logical reasoning to solve a variety of problems.
- CO2** Aware of a class of functions which transforms a finite set into another finite set which relates to input and output functions in computer science.
- CO3** Understand Representation of Graphs and application of Graphs.
- CO4** Identify the Mathematical Structures on many levels.
- CO5** Construct the lattice structure and Boolean algebra.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3			2				1			2			
CO2	3	3			2				1			2			
CO3	3	3		2	2				2			2			
CO4	3	3		2	2				2			2			
CO5	3	3		2	2				2			2			

19ITT302	INTERNET OF THINGS (Offered by Infosys) [Common to CSE & IT]	L	T	P	J	C
		3	0	0	0	3
UNIT I	IoT INTRODUCTION AND APPLICATIONS					8
Overview and Motivations - IPv6 Role - IoT Definitions - Observations - ITU-T Views – Working Definition - IoT Frameworks - Basic Nodal Capabilities – Physical Design of IoT - Logical Design of IoT – Applications:- City Automation Automotive Applications - Home Automation - IoT Levels & Deployment Templates - IoT and M2M						
UNIT II	FUNDAMENTAL MECHANISMS & KEY TECHNOLOGIES					8
Identification of IoT Objects and Services- Structural aspects of IoT-Environment Characteristics-Traffic Characteristics-Scalability-Interoperability-Security and privacy -Key IoT Technologies :Device Intelligence - Communication Capabilities - Mobility Support - Device Power –Sensor Technology -RFID Technology - Satellite Technology - IoT Enabling Technologies- WSN, Cloud computing, Big data Analytics, communication protocols, embedded systems						
UNIT III	EVOLVING IoT STANDARDS & PROTOCOLS					11
IETF IPv6 Routing Protocol for RPL Roll – Constrained Application Protocol (CoAP) – Representational State Transfer (REST) – Third Generation Partnership Project Service Requirements for Machine Type Communications- Over Low Power WPAN (6LoWPAN)- IP in Small Objects (IPSO) - WPAN Technologies for IoT/M2M – ZigBee/IEEE 802.15.4, RF4CE,Bluetooth and its Low-Energy Profile.						
UNIT IV	IPv6 TECHNOLOGIES FOR THE IOT					9
Motivations - Address Capabilities - IPv6 Protocol Overview - IPv6 Tunneling - IPsec in IPv6 - Header Compression Schemes - Quality of Service in IPv6 - MOBILE IPv6 -Protocol Details - Generic Mechanisms - New IPv6 Protocol - Message Types - Destination Option - Modifications to IPv6 Neighbor Discovery - Requirements for Various IPv6 Nodes - Correspondent Node Operation - HA Node Operation-Mobile Node Operation Relationship to IPV4 Mobile IPV4(MIP)-IPV6 Over Low-Power WPAN-Goals-Transmission of IPV6 Packets Over IEEE 802.15.4.						
UNIT V	DESIGN METHODOLOGY & FUTURE TRENDS					9
IoT System Management with NETCONF-YANG: Need for IoT Systems Management – Simple Network Management Protocol (SNMP) –Limitations of SNMP, Network Operator Requirements- NETCONF-YANG-IoT Systems Management with NETCONF-YANG -IoT Platforms Design Methodology – IoT Physical Devices & Endpoints - Raspberry Pi- Linux on Raspberry Pi -Raspberry Pi Interfaces - Programming Raspberry Pi with Python - Designing a RESTful WebAPI - Amazon Web Services for IoT						
		L : 45	T: 0	P: 0	J: 0	Total: 45 PERIODS
TEXT BOOKS						
1	Daniel Minoli, Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications, Wiley Publications, First Edition, 2013.					
2	Arsheep Bahga , Vijay Madiseti , Internet of Things: A Hands-On Approach, Universities Press, First Edition , 2014.					
REFERENCES						
1	Jean-Philippe Vasseur , Adam Dunkels, Interconnecting Smart Objects with IP: The Next Internet, Elsevier Publications, 2010					
2	Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley Publications, First Edition, 2013.					
3	N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014.					
COURSE OUTCOMES						
At the end of the course student should be able to:						
CO1	Explore the physical design of IoT					
CO2	Understand the mechanisms and technologies of IoT					
CO3	Relate various protocols of IoT					
CO4	Analyze IPv6 technologies and its suitability for IoT					
CO5	Know various design methodologies and future trends in IoT					

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	3	2	2		2		2			3	2
CO2	3	2	2	2		2	2					2		2	3
CO3	3	2	2	2		2						2	2		2
CO4	3	2	2	2					2			2		2	
CO5	3	2	2	2								3		2	3

19CST301	INTRODUCTION TO MACHINE LEARNING	L	T	P	J	C
		2	0	0	0	2
UNIT I	INTRODUCTION					6
Machine Learning – perspective – Issues - Examples of Machine Learning Applications – Types of Machine Learning –Machine Learning process- preliminaries, testing Machine Learning algorithms, turning data into Probabilities, and Statistics for Machine Learning, Probability theory -Bayesian Decision Theory.						
UNIT II	SUPERVISED LEARNING					6
Introduction - Linear Models for Regression – Linear Regression Models and Least Squares – Subset Selection – Shrinkage Methods – Derived Input Directions - Linear Models for Classification- Discriminant Analysis – Logistic Regression – Separating Hyper planes.						
UNIT III	DEEP LEARNING					6
Boosting and Additive Trees – Boosting Trees – Regularization – Interpretation – Illustrations -Neural Networks – Fitting Neural Network - Bayesian Neural Net - Neural Network Representation – Problems – Perceptron – Multilayer Networks and Back Propagation Algorithms. Case Study: Handwriting Recognition.						
UNIT IV	UNSUPERVISED LEARNING					6
Introduction - Association Rules – Apriori Algorithm - Clustering- K-means – EM Algorithm- Mixtures of Gaussians - Self-organizing Map - Principal Components, Curves and Surfaces – Independent Component Analysis. Case Study: Weather prediction.						
UNIT V	REINFORCEMENT LEARNING					6
Introduction - Single State Case - Elements of Reinforcement Learning – Model Based Learning - Temporal Difference Learning – Generalization - Partially Observable States. Case Study: Healthcare Prediction.						
		L : 30	T: 0	P: 0	J: 0	Total: 30 PERIODS

TEXT BOOKS

- 1 AlpaydinEthem, “Introduction to Machine Learning”, MIT Press, Second Edition, 2010.
- 2 Trevor Hastie, Robert Tibshirani, Jerome Friedman, “The Elements of Statistical Learning: Data Mining, Inference, and Prediction”, Springer; Second Edition, 2009.

REFERENCES

- 1 Tom M. Mitchell, “Machine Learning”, McGraw-Hill Education (India) Private Limited, 2013.
- 2 Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, “An Introduction to Statistical Learning: with Applications in R”, Springer; First Edition 2013.
- 3 P. Flach, —Machine Learning: The art and science of algorithms that make sense of data, Cambridge University Press, 2012.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Design a learning model appropriate to the application.
- CO2** Illustrate various supervised learning algorithms
- CO3** Create and deploy deep neural network applications.
- CO4** Synthesize the usage of unsupervised learning algorithms
- CO5** Apply reinforcement learning algorithms to solve problems.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1		3	1	3					1		2	3		
CO2		3	3	2							1			2	3
CO3	2	1			2		2						2	3	
CO4	2	2	3	2			1	1			3		2		
CO5	2	1		3		1			2					2	

19CSB301	AUTOMATA THEORY AND COMPILER DESIGN	L	T	P	J	C
		3	0	2	0	4
UNIT I	FINITE AUTOMATA AND REGULAR LANGUAGES	9+6				
Introduction - Central concepts of Automata Theory - Types of Grammars- Regular Expressions, Identity rules for Regular Expressions -Finite State Automata - Deterministic Finite State Automata(DFA), Non Deterministic Finite State Automata(NDFA) - Equivalence of DFA and NDFA - Pushdown Automata - Languages of a Pushdown Automata -- Turing Machines- Languages of Turing Machine.						
Lab Practice:						
Construction of NFA from Regular Expression.						
Construction of minimized DFA from a given regular expression						
UNIT II	COMPILERS AND LEXICAL ANALYSIS	9+6				
Introduction to Compiling – Compilers – Analysis of the source program – The phases – Cousins – The grouping of phases – Compiler construction tools. The role of the lexical analyzer – Input buffering – Specification and Recognition of tokens – Finite automata – Regular expression to finite automata – A language for specifying lexical analyzer – tool for generating lexical analyzer.						
Lab Practice:						
Implementation of Lexical Analyzer						
Implementation of LEX specification.						
UNIT III	SYNTAX ANALYSIS AND SEMANTIC ANALYSIS	9+6				
Syntax Analysis – The role of the parser – Context-free grammars – Writing a grammar – Top down parsing – Bottom-up Parsing – LR parsers – SLR Parsers – Canonical LR Parsers – LALR Parsers – Constructing an LR parsing table – Tool to generate parser – Semantic Analysis: Type Checking – Type Systems – Specification of a simple type checker.						
Lab Practice:						
Construction of LR parsing table.						
Implementation of syntax analysis using YACC						
Construction of Shift Reduce Parser.						
UNIT IV	RUN TIME ENVIRONEMENT AND INTERMEDIATE CODE GENERATION	9+6				
Run-Time Environments – Source language issues – Storage organization – Storage-allocation strategies – Intermediate languages – Declarations – Assignment statements – Boolean expressions – Case statements – Back patching – Procedure calls.						
Lab Practice:						
Generation of code for a given intermediate code generator.						
UNIT V	CODE GENERATION AND CODE OPTIMIZATION	9+6				
Issues in the design of a code generator – The target machine – Run-time storage management – Basic blocks and flow graphs – Next-use information – A simple code generator – Register allocation and assignment – The DAG representation of basic blocks – Generating code from DAGs.						
Introduction to optimization techniques – The principle sources of optimization – Peephole optimization – Optimization of basic blocks – Loops in flow graphs – Introduction to global data-flow analysis – Code improving transformations.						
Lab Practice:						
Implementation of DAG representation.						
		L : 45	T: 0	P: 30	J: 0	Total: 75 PERIODS

TEXT BOOKS

- 1 John E. Hopcroft and Rajeev Motwani and Jeffrey D. Ullman, "Introduction to Automata Theory, Languages and Computation", Second Edition, Pearson Education, New Delhi, 2007.
- 2 Alfred V. Aho, Ravi Sethi Jeffrey D. Ullman, "Compilers- Principles, Techniques, and Tools", Second Edition , Pearson Education Asia, 2012.

REFERENCES

- 1 Linz P. An introduction to formal languages and automata. Sixth edition, Jones and Bartlett Publishers; 2016.
- 2 C. N. Fisher and R. J. LeBlanc "Crafting a Compiler with C", First Edition, Pearson Education, 2000.
- 3 D.Chithra , "Principles of Compiler Design", First Edition, CBS Publishers and Distributors , 2014.
- 4 Alfred V. Aho, Jeffrey D. Ullman, "Principles of Compiler Design", Second Edition, Addison-Wesley Publ., 2008.
- 5 Ramaiah k. Dasaradh "Introduction to Automata and Compiler Design " First Edition ,Prentice Hall India Learning Private Limited,2011.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the Concepts of Formal Languages and automata theory.
- CO2** Examine the knowledge of patterns , tokens and regular expression for solving a problem
- CO3** Apply the knowledge of LEX tool & YACC tool to develop a scanner and Parser
- CO4** Analyze simplified instructions for Intermediate Code Generation in compiler
- CO5** Design and implement software system for synthesis phase of the compiler

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	2	3	2	2	2	2	3	1	2	2	2	3
CO2		2		2	3								3	3	
CO3	3	3		2	1										3
CO4			3	2	2									3	
CO5				3	3						1	2			2

UNIT I FUNDAMENTALS AND PHYSICAL LAYER**9+6**

Building a network, Requirements, Data communication Components, Data representation and Data flow, Networks, Types of Connections, Topologies, Protocols and Standards, Layering and protocols, Internet Architecture, Network software, Performance, Transmission Media, Networking Devices.

Lab Practice:

1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and trace route PDUs using a network protocol analyzer and examine.
2. Study on different types of networking devices.

UNIT II DATA LINK LAYER AND MEDIA ACCESS**9+6**

Link layer Services, Framing, Error Detection and Error Correction, Flow control, Media access control, Random Access, CSMA/CD, CDMA/CA, Ethernet (802.3), Wireless LANs, 802.11, Virtual LANs

Lab Practice:

1. Implement the data link layer framing methods such as character, character stuffing and bit stuffing
2. Implement on a data set of characters the three CRC polynomials –CRC 12, CRC 16 and CRC CCIP.

UNIT III INTERNETWORKING AND ROUTING**9+6**

Logical addressing, Basic Internetworking (IP, CIDR, ARP, BOOTP, DHCP, ICMP), Routing algorithms, Routing (RIP, OSPF, metrics), Global Internet (Areas, BGP, IPv6), SDN.

Lab Practice:

1. Implement Dijkstra's algorithm to compute the Shortest path through a graph
2. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm.

UNIT IV TRANSPORT LAYER**9+6**

Overview of Transport layer, UDP, Reliable byte stream (TCP), SCTP, Connection management, Flow control, Retransmission, TCP Congestion control, QoS, Application requirements, Socket Programming.

Lab Practice:

1. Write a program to implement RPC (Remote Procedure Call).
2. Applications using TCP sockets like:
 - a) Echo client and echo server
 - b) Chat

UNIT V APPLICATION LAYER**9+6**

Traditional applications, Electronic Mail (SMTP, POP3, IMAP, MIME), HTTP, Web Services, DNS, DDNS, TELNET, File transfer Protocol. Case Studies – Hybrid Cloud Networking – Amazon VPC, Google Cloud, Azure

Lab Practice:

1. Write a HTTP web client program to download a web page using TCP sockets
2. Implementation of Applications using TCP and UDP Sockets like
 - a. DNS
 - b. File Transfer

L : 45 T : 0 P:30 J : 0 Total: 75 PERIODS

TEXT BOOKS

- 1 Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers, 2011.
- 2 Behrouz A. Forouzan, "Data communication and Networking", Fourth Edition, Tata McGraw – Hill, 2011.

REFERENCES

- 1 James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.
- 2 Nader. F. Mir, "Computer and Communication Networks", Second Edition, Pearson Prentice Hall Publishers, 2010.
- 3 Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", Second Edition, Mc Graw Hill Publisher, 2011.
- 4 William Stallings, "Data and Computer Communication", Eighth Edition, Pearson Education, 2007.
- 5 A.S. Tanenbaum, "Computer Networks", Fourth Edition, Pearson Education, 2003.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Recognize network components, topologies, Transmission media used in distributed networks.
- CO2** Gain knowledge in functions of each layer in OSI, TCP/IP Reference Model.
- CO3** Identify, compare and contrast different techniques and design issues of core functions such as addressing, routing, internetworking, switching, multiplexing, error and flow control, medium access and coding.
- CO4** Implement internet protocols and congestion control algorithms.
- CO5** Apply various networking concepts to real time applications.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	2	2	2						2	3		2
CO2	2		2		2				2				2		2
CO3		3	2		2			2	2	2		1	2	2	2
CO4		2			2						2	1	1	2	
CO5	2	2			3	2	3				3				3

LIST OF EXPERIMENTS

- 1.Installation and configuration of R programming environment.
- 2.Data types and operations on numbers, characters and composites.
- 3.Data entry and exporting data.
- 4.Data input/output and Data storage formats.
- 5.Grouping Control Structures and Functions.
- 6.Exploratory data analysis and Visualization
- 7.Outlier Analysis
- 8.Decision Trees
- 9.K-NN Classification
10. Naive Bayes and Logistic Regression
11. K-Means Clustering
12. Tabular data and Analysis.

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS**Hardware**

- Internet connection (DSL, LAN, or cable connection desirable) – 30 Nos.

Software

- OS – Windows / UNIX Clone
- R statistical software & RStudio IDE

L: 0 T:0 P:60 J : 0 TOTAL:60 PERIODS**COURSE OUTCOMES**

At the end of the course students should be able to:

- CO1 Identify and use available R packages and associated Open Source software to meet objectives.
- CO2 Extend the functionality of R by using add-on packages
- CO3 Extract data from files and other sources and perform various data manipulation tasks on them.
- CO4 Implement the Machine Learning Algorithms
- CO5 Apply the knowledge of R gained to data Analytics for real life applications

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2		1								3	3	2		1
CO2	1	2	1	1		3	2			2		2	1	2	1
CO3	1	1		2							1	2	1	1	
CO4	2		3	1	2		2					3	2		3
CO5	3	2			1	2	1		3	1	2	1	3	2	

Suggested Topics to carry out the Mini Project Work (Not limited to)

Students are recommended to carry out their work blending Machine Learning with IoT.

Applications related to Machine Learning / IoT which falls under 7- Industrial Verticals are as follows:

1. AGRICULTURE AND FOOD TECHNOLOGY
2. HEALTH CARE
3. SMART CITY
4. FINTECH
5. ENERGY
6. AUTOMOBILE INDUSTRY
7. AEROSPACE & DEFENSE

Guidelines

1. Group of three to four members are formed as a team to carry out the mini project
2. Each team is guided by an Faculty In-charge for carrying out the Mini Project work
3. Each group along with the concerned faculty shall identify a potential problem statement, on which the implementation is to be conducted.
4. The students need to empathize, define, Ideate, Prototype/Design using Raspberry pi/Arduino etc., with help of any ML algorithms.
5. Demonstrate their model in project competition / publish in Conference or Scopus indexed Journal.
6. Prepare a detailed report illustrating the work carried out and present in the final viva voce.

L: 0 T:0 P:0 J : 30 TOTAL: 30 PERIODS

TEXTBOOKS

1. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann, First Edition , Elsevier, 2010.
2. Designing the Internet of Things, Adrian McEwen , Hakim Cassimally, Second Edition, Wiley India Publishers, 2015 .

COURSE OUTCOMES

At the end of the course students should be able to

- CO1 Identify the basic necessities of real world scenario.
- CO2 Apply the stages of Design Thinking approach to real world situations.
- CO3 Build the project with hardware/coding/emulation
- CO4 Test the results of project with existing models.
- CO5 Demonstrate and manage to explicate the work carried out.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1								3			3	3			
CO2	3		3									3		2	
CO3			3												2
CO4				2											
CO5								2			2				3

SEMESTER VI

19CST302	NEURAL NETWORKS AND DEEP LEARNING	L	T	P	J	C
		3	0	0	0	3
UNIT I	BASICS OF NEURAL NETWORKS					9

Basic Concept of Neurons – Perceptron Algorithm – Single Layer Neural Network and Multilayer Neural Network- Feed Forward Neural Network and Back propagation Networks- Create and deploy neural networks using Tensor Flow for Image data.

UNIT II	INTRODUCTION TO DEEP LEARNING	9
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Deep Neural Networks – Gradient Descent –Differentiation Algorithms – Vanishing Gradient Problem – Mitigation – Rectified Linear Unit (ReLU) – Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent.

UNIT III	CONVOLUTIONAL NEURAL NETWORKs	9
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CNN Architectures – Convolution Layer– Pooling Layers –Hyper parameter–Activation Function– Recurrent and Recursive Nets – Recurrent Neural Networks – Deep Recurrent Networks – Recursive Neural Networks – Create and deploy Convolutional Neural networks using Keras for Image data.

UNIT IV	DEEP LEARNING ARCHITECTURES	9
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Long Short Term Memory (LSTM) Networks – Sequence Prediction – Gated Recurrent – Encoder/Decoder Architectures – Autoencoders – Standard – Sparse – Denoising – Contractive – Variational Autoencoders – Applications of Autoencoders – Case Study: Representation Learning

UNIT V	APPLICATIONS OF DEEP LEARNING	9
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Images segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative adversarial networks – Video to Text with LSTM models – Attention models for Computer Vision.

Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Ian J. Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2017.
- 2 Francois Chollet, “Deep Learning with Python”, Manning Publications, 2018.

REFERENCES

- 1 Phil Kim, “Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence”, Apress, 2017.
- 2 Ragav Venkatesan, Baoxin Li, “Convolutional Neural Networks in Visual Computing”, CRC Press, 2018.
- 3 Navin Kumar Manaswi, “Deep Learning with Applications Using Python”, Apress, 2018.
- 4 Joshua F. Wiley, “R Deep Learning Essentials”, Packt Publications, 2016.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the basic ideas and principles of neural networks.
- CO2** Understand the basic concepts of deep learning.
- CO3** Familiarize with image processing facilities like TensorFlow and Keras.
- CO4** Implement deep learning architectures.
- CO5** Create applications using Deep learning techniques.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1			1	2		1									1
CO2	1		1			1			2				1		1
CO3		1	2					2						1	2
CO4		2			1							1		2	
CO5					1	1							3		

UNIT-I 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.

Lab Practice:

1. Installation of Java Wireless Toolkit (J2ME)
2. Working with J2ME Features

UNIT-II BUILDING BLOCKS OF MOBILE APPS - I**9 + 6**

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.

Lab Practice:

1. Working on Drawing and Images
2. Create a program which creates to following kind of menu Like cut, copy, paste, delete, select all and unselect all

UNIT-III BUILDING BLOCKS OF MOBILE APPS - II**9 + 6**

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)

Lab Practice:

1. Developing Broadcast Receiver Applications using the IDE
2. Developing Telephone and SMS Applications using the IDE

UNIT-IV SPRUCING UP MOBILE APPS**9 + 6**

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)

Lab Practice:

1. Developing Animated Applications using custom views, canvas
2. Developing Applications to play music in background

UNIT-V TESTING MOBILE APPS AND TAKING APPS TO MARKET**9 + 6**

Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk, Versioning, signing and packaging mobile apps, distributing apps on mobile market place.

Lab Practice:

1. Testing developed applications

L : 45 T: 0 P:30 J: 0 Total: 75 PERIODS**TEXT BOOKS**

1. Anubhav Pradhan, Anil V Deshpande, “Mobile Apps Development”, First Edition, Wiley India, 2013

REFERENCES

1. Barry Burd, “Android Application Development All in one for Dummies”, First Edition, Wiley India, 2011
2. Lauren Darcey, Shane Conder, “Teach Yourself Android Application Development in 24 Hours”, Second Edition, Wiley India, 2012

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Familiarize with Mobile apps development Platform
- CO2** Know the concepts of user interfaces
- CO3** Understand the building blocks
- CO4** Design and deploy mobile apps
- CO5** Perform testing, signing, packaging and distribution of mobile apps

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2								1				2		
CO2	2									2			2		
CO3		2			3	1	2				2			2	
CO4			3				2	2							
CO5		2		3	3	1	3					2		2	

LIST OF EXPERIMENTS

1. Develop static pages (using only HTML) of an online Book store. The pages should resemble: www.amazon.com. The website should consist the following pages. Home page, Registration and user Login, User profile page, Books catalogue, Shopping cart, Payment by credit card, order confirmation.
2. Write a JavaScript to design a simple calculator to perform the following operations:
Sum, Product, Difference and Quotient
3. Design an XML document to store information about a student in an engineering college affiliated to Anna University. The information must include USN, Name, and Name of the College, Branch, Year of Joining, and email id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.

4. Develop an E-commerce Application**Requirements**

- Develop complete API backend model to have the necessary route endpoints for the GET and
- POST
- Design authentication system for Login, Registration, Forgot password, Registered user
- verification.
- Use Reactjs for the frontend to implement a responsive UI with the look and feel.
- Also, let the user add items to the cart.

Backend: NodeJS**Frontend:** Reactjs**Database:** MongoDB**5. Implement OTP Manager****Requirements**

- Design a responsive UI with React js.
- Ask the user to enter an email id and save it in the database.
- When the user submits the requisites, generate a random string, and send(OTP) to the user.
- Save OTP in the database.
- After the user inputs the OTP, the node backend code will verify if the code submitted is the same as the code saved in the database.

Backend: Node JS**Frontend:** React JS**Database:** MongoDB**6. Develop Social Media App****Requirements**

- Develop an app where users can engage with one and another online
- Provide security look up for the developed app.

Backend: PGSQL**Frontend:** Node JS**Database:** MongoDB

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

Software Requirements

- Java Eclipse
- Netbeans

Hardware Requirements

- Dual Core Processor
- 2GB RAM

160GB HDD

L :0 T: 0 P: 60 J: 0 Total:60 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

- CO 1** Develop elegant and responsive Front-end and Backend by leveraging latest technologies
- CO 2** Design and Implement Forms, inputs and Services using Angular JS
- CO 3** Develop a simple web application using Nodejs; Angular JS and Express
- CO 4** Implement data models using Mongo DB
- CO 5** Students will be become an industry-ready engineer who can be readily deployed in a project

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1		2	3		2			2	1	2	1	2	2		
CO2	2		3		3									1	
CO3		2	3	2			2		3	2		2	2	1	
CO4											1				
CO5		2				1	2	2	2	2					1

GOALS AND OBJECTIVES

1. Design Thinking/Problem Solving: Exercise sound reasoning to analyze issues, make decisions, and overcome problems. The individual is able to obtain, interpret, and use knowledge, facts, and data in this process, and may demonstrate originality and inventiveness.
2. Teamwork/Collaboration: Build collaborative relationships with colleagues and customers representing diverse cultures, races, ages, genders, religions, lifestyles, and viewpoints. The individual is able to work within a team structure, and can negotiate and manage conflict.
3. Digital Technology: Leverage existing digital technologies ethically and efficiently to solve problems, complete tasks, and accomplish goals. The individual demonstrates effective adaptability to new and emerging technologies.
4. Leadership: Leverage the strengths of others to achieve common goals, and use interpersonal skills to coach and develop others. The individual is able to assess and manage his/her emotions and those of others; use empathetic skills to guide and motivate; and organize, prioritize, and delegate work.
5. Professionalism/Work Ethic: Demonstrate personal accountability and effective work habits, e.g., punctuality, working productively with others, and time workload management, and understand the impact of non-verbal communication on professional work image. The individual demonstrates integrity and ethical behavior, acts responsibly with the interests of the larger community in mind, and is able to learn from his/her mistakes.
6. Global/Intercultural Fluency: Value, respect, and learn from diverse cultures, races, ages, genders, sexual orientations, and religions. The individual demonstrates openness, inclusiveness, sensitivity, and the ability to interact respectfully with all people and understand individuals' differences.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Assess interests and abilities in their field of study.
- CO2** Develop communication, interpersonal and other critical skills in the job interview process
- CO3** Analyse the functioning of internship organization and recommend changes for improvement in processes
- CO4** Build a record of work experience.
- CO5** Acquire employment contacts leading directly to a full-time job following graduation from college.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2					2		1			3		1		
CO2			2	1							3	1			
CO3									1	1					
CO4												2		1	
CO5						2					3				1

19HST105	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	2	0	0	0	0

UNIT I ANCIENT INDIA & STATE POLITY 6

State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions' of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage.

UNIT II INDIAN LITERATURE, CULTURE, TRADITION, AND PRACTICES 6

Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist And Jain Literature in Pali, Prakrit And Sanskrit, Kautilya's Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature, Malayalam Literature ,Sangama Literature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature

UNIT III INDIAN RELIGION, PHILOSOPHY, AND PRACTICES 6

Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines , Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.

UNIT IV INDIAN KNOWLEDGE SYSTEM ON SCIENCES & TRADE 6

Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India ,Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Trade in Ancient India

UNIT V INDIAN CULTURAL HERITAGE & ARTS 6

Indian architect, engineering and architecture in ancient India, sculptures, seals, coins, pottery, puppetry, dance, music, theatre, drama, painting, martial arts traditions, fairs and festivals, current developments in arts and cultural, Indian's cultural contribution to the world. Indian cinema, yoga.

L :30 T: 0 P: 0 J: 0 T: 30 PERIODS

REFERENCES

- 1 V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
- 2 S. Baliyan, Indian Art and Culture, Oxford University Press, India
- 3 Swami Jitatanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
- 4 Romila Thapar, Readings In Early Indian History Oxford University Press , India
- 5 Fritz of Capra, Tao of Physics
- 6 Fritz of Capra, The wave of Life
- 7 V N Jha (English Translation), Tarkasangraha of Annam Bhatta, International Chinmay Foundation, Velliarnad, Amakuram
- 8 Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata
- 9 GN Jha (Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakasham, Delhi, 2016
- 10 RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016
- 11 R Sharma (English translation), Shodashang Hridayam
- 12 Basham, A.L., The Wonder that was India (34th impression), New Delhi, Rupa & co
- 13 Sharma, R.S., Aspects of Political Ideas and Institutions in Ancient India(fourth edition), Delhi, Motilal Banarsidass,

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Understand the Ancient India and State Polity
- CO2** Understand the Indian Literature, Culture, Tradition, and Practices
- CO3** Understand the Indian Religion, Philosophy, and Practices
- CO4** Understand the Indian Knowledge System on Sciences & Trade
- CO5** Understand the Indian Cultural Heritage & Arts

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3		2									3		3
CO2					3					3				2	
CO3	3		3		3						1		2		3
CO4			3			2							3		
CO5	3	3		2								3	3		3

SEMESTER VII

19GET201	PROFESSIONAL ETHICS AND HUMAN VALUES	L	T	P	J	C
		2	0	0	0	2
UNIT I	ENGINEERING ETHICS					6

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy– Uses of Ethical Theories.

UNIT II	ENGINEERING AS SOCIAL EXPERIMENTATION	6
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Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law –Plagiarism- Case studies

UNIT III	RESPONSIBILITIES AND RIGHTS	6
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Collegiality and loyalty-Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights –Intellectual Property Rights (IPR) – Discrimination.

UNIT IV	UNIVERSAL HUMAN VALUES - INTRODUCTION	6
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Need, Basic Guidelines, Content and Process for Value Education - Understanding Harmony in the Human Being - Harmony in Myself! - Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

UNIT V	UNIVERSAL HUMAN VALUES - HARMONY	6
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Understanding Harmony in the Nature and Existence - Whole existence as Co-existenceImplications of the above Holistic Understanding of Harmony on Professional Ethics

L :30 T: 0 P: 0 J: 0 T:30 PERIODS

TEXT BOOKS

- 1 Mike W. Martin and Roland Schinzinger, Ethics in Engineering, Tata McGraw Hill, New Delhi,2003
- 2 R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2

REFERENCES

- 1 Govindarajan M, Natarajan S, Senthil Kumar V. S, Engineering Ethics, Prentice Hall of India, New Delhi, 2004.
- 2 Charles B. Fleddermann, —Engineering Ethics, Pearson Prentice Hall, New Jersey, 2004.
- 3 Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, —Engineering Ethics – Concepts and Cases, Cengage Learning, 2009.
- 4 Edmund G Seebauer and Robert L Barry, —Fundamentals of Ethics for Scientists and Engineers, Oxford University Press, Oxford, 2001.
- 5 Laura P. Hartman and Joe Desjardins, —Business Ethics: Decision Making for Personal Integrity and Social Responsibility Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.

COURSE OUTCOMES :

At the end of the course students should be able to

- | | |
|------------|--|
| CO1 | Create an awareness on Human Values |
| CO2 | Understand moral issues and sense of Engineering Ethics |
| CO3 | Understand code of Ethics and Engineering as Experimentation |
| CO4 | Study the safety, responsibility and rights |
| CO5 | Visualize the global issues and code of conduct |

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3		2											3
CO2					3					3					
CO3	3		3		3						1				3
CO4			3			2									
CO5	3	3		2											3

UNIT I INTRODUCTION TO LIFE**6**

Characteristics of living organisms-Basic classification-cell theory-structure of prokaryotic and eukaryotic cell-Introduction to biomolecules: definition-general classification and important functions of carbohydrates-lipids-proteins-nucleic acids vitamins and enzymes-genes and chromosome

UNIT II BIODIVERSITY**6**

Plant System: basic concepts of plant growth-nutrition-photosynthesis and nitrogen fixation-Animal System: elementary study of digestive-respiratory-circulatory-excretory systems and their functions-Microbial System: history-types of microbes-economic importance and control of microbes

UNIT III GENETICS AND IMMUNE SYSTEM**6**

Evolution: theories of evolution - Mendel's cell division-mitosis and meiosis-evidence of e laws of inheritance-variation and speciation-nucleic acids as a genetic material-central dogma immunity-antigens-antibody-immune response

UNIT IV HUMAN DISEASES**6**

Definition-causes, symptoms, diagnosis, treatment and prevention of diabetes, cancer, hypertension, influenza, AIDS and Hepatitis

UNIT V BIOLOGY AND ITS INDUSTRIAL APPLICATION**6**

Transgenic plants and animals-stem cell and tissue engineering-bioreactors-biopharming-recombinant vaccines-cloning-drug discovery-biological neuralnetworks-bioremediation-biofertilizer-biocontrol-biofilters-biosensors-biopolymers-bioenergy-biomaterials-biochips-basic biomedical instrumentation.

L :30 T: 0 P: 0 J: 0 T:30 PERIODS**TEXT BOOKS**

- 1 A Text book of Biotechnology, R.C.Dubey, S. Chand Higher Academic Publications, 2013
- 2 Diseases of the Human Body, Carol D. Tamparo and Marcia A. Lewis, F.A. Davis Company, 2011.
- 3 Biomedical instrumentation, Technology and applications, R. Khandpur, McGraw Hill Professional, 2004

REFERENCES

- 1 Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis, 2011
- 2 Cell Biology and Genetics (Biology: The unity and diversity of life Volume I), Cecie Starr, Ralph Taggart, Christine Evers and Lisa Starr, Cengage Learning, 2008
- 3 Biotechnology Expanding horizon, B.D. Singh, Kalyani Publishers, 2012

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Grasp and apply biological engineering principles, procedures needed to solve real-world problems
CO2 Apply the concept of plant, animal and microbial systems and growth in real life situations
CO3 Comprehend genetics and the immune system
CO4 Know the cause, symptoms, diagnosis and treatment of common diseases
CO5 Give a basic knowledge of the applications of biological systems in relevant industries

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	3		3							2		3		
CO2	3	3		3							2		3		
CO3	3	3									2		3		
CO4	2	3	3	3								3	3		
CO5	2	3	3	3								3	3		

PROCEDURE TO FOLLOW

1. Identification of the Project
2. Literature survey
3. Presenting review paper
4. Report should summarize the methodology to be adopted, work plan for the proposed project work
5. Chosen Existing System Implementation

L : 0**T: 0****P:0****J: 60****Total:60 PERIODS****COURSE OUTCOMES**

At the end of the course student should be able to:

CO1 Identify, define and justify scope of the chosen problem**CO2** Categorize and summarize an appropriate list of literature review, analyze previous researchers' Work and relate them to the project**CO3** Propose possible solutions for the existing problem**CO4** Define an optimized solution to solve the problem**CO5** Acquire knowledge about the project documentation and present their project phase I work in reputed conference

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2											1	2		
CO2		3		2								2	3		
CO3			3				2					2		2	3
CO4	2				2				2	2	3	2		3	3
CO5						1		2				1		1	2

SEMESTER VIII

19CSP402

PROJECT -II

L T P J C
0 0 0 20 10

PROCEDURE TO FOLLOW

- Proposed System Implementation
- Presenting review paper
- Report should summarize the Proposed methodology adopted
- Thesis Preparation

L : 0 T: 0 P: 0 J: 300 Total:300 PERIODS

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Apply coding, debugging and testing tools to enhance the quality of the project
- CO2** Execute and demonstrate the proposed work by using modern technologies/tools
- CO3** Communicate effectively and present ideas clearly and coherently to specific audience in both the written and oral forms.
- CO4** Develop an effective leadership quality and acquire skills for managing projects and project team members. Recognize the need for life-long learning by undergoing the project work.
- CO5** Publish project phase II work in high impact factor journals, conference proceedings or patents

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs) / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2			2											
CO2		2	3								3		3		3
CO3					3					3					
CO4						2	2		3			3		2	2
CO5								2							

Professional Elective - I

19CSE301	INTRODUCTION TO DATA SCIENCE	L	T	P	J	C
		3	0	0	0	3
UNIT I	DATA SCIENCE LIFE CYCLE					9

Generalizing from Data-Rectangular Data-Relational Databases and SQL- Indexes, Slicing, Sorting-Applying & Plotting Data science Process.

UNIT II	UNDERSTANDING THE DATA	9
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Data Representation-Data Quality-Exploratory Data Analysis-Data Visualization-Text Mining -Text Analytics.

UNIT III	DATA SOURCES	9
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Working with Text-Regular Expressions-Web Technologies-REST-Xpath-Handling large Data on a Single Computer -Applications for Machine Learning in Data Science-Introducing Naive Bayes Classifiers-The Rise of graph databases

UNIT IV	CLASSIFICATION	9
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Regression on Probabilities-The Logistic Model-A Loss Function for the Logistic Model-Fitting the Logistic Model-Evaluating the Logistic Models- Multiclass Classification-Data visualization to the End Users

UNIT V	REPLICABILITY	9
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P-hacking-Dimensionality Reduction-PCA-PCA using Singular value Decomposition-Decision tree-Random Forest.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 AlpaydinEthem, "Introduction to Machine Learning", MIT Press, Second Edition, 2010.
- 2 Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer; Second Edition, 2009.

REFERENCES

- 1 Tom M. Mitchell, "Machine Learning", McGraw-Hill Education (India) Private Limited, 2013.
- 2 Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, "An Introduction to Statistical Learning: with Applications in R", Springer; First Edition 2013.
- 3 P. Flach, —Machine Learning: The art and science of algorithms that make sense of data, Cambridge University Press, 2012.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand Data sources, generations, data formats, Data Evolution, Data from various domains
- CO2** Understand Big Data Characteristics What, Why, When, Limitation of traditional approaches and models. Map Big Vs to Data Domains
- CO3** Analyze various domains of Big Data Characteristics, Platform, Programming Model and Design Big Data framework ecosystem.
- CO4** Emphasize the mathematical and statistical foundations necessary to understand data science.
- CO5** Expose students to real world data sets and their applications.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1		2		3	2		2	1					2		1
CO2				3		1	2								
CO3		3	2						2			1			
CO4	3		2	1							2				
CO5	1				2	2		3		3		2		1	2

UNIT I DATA MINING

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

UNIT II DATA WAREHOUSING & BUSINESS ANALYSIS

9

Basic Concepts: Data Warehousing: A multitier Architecture, Data warehouse models: Enterprise warehouse, Data mart and virtual warehouse, Extraction, Transformation and loading, Data Cube: A multidimensional data model, Stars, Snowflakes and Fact constellations: Schemas for multidimensional Data models, Dimensions: The role of concept Hierarchies, Measures: Their Categorization and computation, Typical OLAP Operations.

UNIT III ASSOCIATION & CORRELATION

8

Market Basket Analysis – Frequent Item Set Mining methods – Apriori algorithm – Generating Association Rules – A Pattern Growth Approach – Association Analysis to Correlation Analysis – Explore Weka and run Apriori algorithm with different support and confidence values (Supermarket dataset)

UNIT IV CLASSIFICATION

10

Basic concepts – Decision Tree Induction – Bayes Classification Methods – Rule based Classification – Model Evaluation and Selection – Techniques to improve Classification Accuracy – Classification by Back propagation- Support Vector Machines – Lazy Learners- Genetic Algorithm – Experiments with Weka (Iris plants dataset)

UNIT V CLUSTERING

9

Basic issues in clustering – Partitioning methods: K-means, K-Medoids – Agglomerative Hierarchical Clustering – DBSCAN – Cluster Evaluation – Density Based Clustering – Grid Based Methods – Evaluation of clustering – Explore clustering techniques available in Weka (Breast cancer dataset)

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS**TEXT BOOKS**

- 1 J. Han and M. Kamber, Data Mining: Concepts and Techniques, Third Edition, Morgan Kaufman, 2013.
- 2 Dunham M H, "Data Mining: Introductory and Advanced Topics", Pearson Education, New Delhi, 2003.

REFERENCES

- 1 M Sudeep Elayidom, "Data Mining and Warehousing", 1st Edition, 2015, Cengage Learning India Pvt. Ltd.
- 2 Charu C. Aggarwal, Data Mining: The Textbook, Springer, 2015.
- 3 G. K. Gupta, Introduction to Data Mining with Case Studies, Easter Economy Edition, Prentice Hall of India, 2014.
- 4 Zaki and Meira, Data Mining and Analysis Fundamental Concepts and Algorithms, 2014
- 5 Pang-Ning Tan and Michael Steinbach, "Introduction to Data Mining", Addison Wesley, 2006

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Apply appropriate techniques to convert raw data into suitable format for practical data mining tasks
- CO2** Identify the key process of Data mining and Warehousing
- CO3** Make use of the concept of association rule mining in real world scenario
- CO4** Analyze and compare various classification algorithms and apply in appropriate domain
- CO5** Select appropriate clustering and algorithms for various applications

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	3	2	3	2			2	1	3	3		1
CO2	1	2	2	1				2		1	1	1	1	2	
CO3	3	1			1	2	2								
CO4	3	3		2	2		2					2	2	1	
CO5	2	2		3			1					3		2	1

UNIT I PROBLEM SOLVING

Introduction – AI problems – Problem Characteristics – Agents – Structure of an agent – Problem formulation – uninformed search strategies – heuristics – informed search strategies – constraint satisfaction.

UNIT II LOGICAL REASONING

Logical agents – propositional logic – inferences – first-order logic – inferences in first order logic – propositional Vs. first order inference – unification & lifts – forward chaining – backward chaining – resolution.

UNIT III PLANNING

Planning with state-space search – partial-order planning – planning graphs – planning and acting in the real world.

UNIT IV UNCERTAIN KNOWLEDGE AND REASONING

Uncertainty – review of probability - probabilistic Reasoning – Semantic networks – Bayesian networks – inferences in Bayesian networks – Temporal models – Hidden Markov models.

UNIT V LEARNING

Learning from observation – Inductive learning – Decision trees – Explanation based learning – Statistical Learning methods – Reinforcement Learning – Neural net learning & Genetic learning. Case Study: Security in AI - Home Security, Crime prevention Camera, Military Reconnaissance, Offshore oil & Gas threat detection

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, Third Edition, Pearson Education, 2013.
- 2 David Poole, Alan Mackworth, Randy Goebel, “Computational Intelligence: A Logical Approach”, Second Edition, Oxford University Press, 2004.

REFERENCES

- 1 G. Luger, “Artificial Intelligence: Structures and Strategies for complex problem solving”, Fourth Edition, Pearson Education, 2002.
- 2 Elaine Rich , Kevin Knight, “Artificial Intelligence”, Third Edition, Tata McGraw Hill, 2009.
- 3 Anindita Das, “Artificial Intelligence & Soft Computing for Beginners”, First Edition, Shroff Publishers & Distributors Pvt Ltd, 2013.
- 4 Stuart Russell, Peter Norvig, “Artificial Intelligence: A Modern Approach”, Third Edition, Pearson Education, 2009.
- 5 Ben Coppin, “Artificial Intelligence Illuminated”, First Edition, Pearson Education, 2004.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Learn the basics of AI, intelligent agents.
- CO2** Understand the logical reasoning approaches to Artificial Intelligence programming.
- CO3** Recognize classical planning methods in real world.
- CO4** Apply knowledge representation techniques and problem solving strategies to AI applications.
- CO5** Implement appropriate algorithm to real world problems.

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3		2	1		3						3	3	
CO2	2	3		2					2		1		2	3	
CO3	2		3	3	2			2					2		3
CO4	3	2		1			2	3			1		3	2	
CO5			2	3	1		2				2				2

UNIT I CYBER SECURITY FUNDAMENTALS**9**

Network and Security concepts – Information Assurance – Cryptography – Domain Name System (DNS) – Firewall – Virtualization – Radio-Frequency Identification. Attacker technique and motivation – proxy – tunnelling Technique – fraud techniques – Threat Infrastructure.

UNIT II CYBER FORENSICS**9**

Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics.

UNIT III CYBERCRIME: MOBILE AND WIRELESS DEVICES**9**

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

UNIT IV DEFENSE AND ANALYSIS TECHNIQUES**9**

Memory Forensics – Honeypots – Malicious Code Naming – Automated Malicious Code Analysis System – passive and active analysis – Intrusion Detection System.

UNIT V CYBER SECURITY: ORGANIZATIONAL IMPLICATIONS**9**

Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations Case Study: Ransomware Attack(WannaCry, Petya, Sodinokibi, Ryuk)

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS**TEXT BOOKS**

- 1 James Graham, Richard Howard and Ryan Otson, "Cyber Security Essentials", First Edition, CRC Press, 2011.
- 2 Nina Godbole and SunitBelpure, "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley 2011.

REFERENCES

- 1 Raef Meeuwisse, Cyber Security for Beginners, Cyber Simplicity Ltd., 2017.
- 2 William Stallings, "Cryptography and Network Security: Principles and Practice." Fifth Edition Prentice Hall 2011.
- 3 William R. Cheswick and Steven M. Bellovin, "Firewalls and Internet Security: Repelling the Wily Hacker", Second Edition, Addison-Wesley, 2003.
- 4 Charles P. Pfleeger, "Security in Computing", Fifth Edition, Pearson Education 2015.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Learn the fundamentals of cyber security and various attacker techniques
- CO2** Interpret and forensically investigate on security attacks
- CO3** Illustrate about mobile devices cyber crime
- CO4** Evaluate various analysis techniques to overcome the attacks
- CO5** Apply the security measures in and out of an organization

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	2		2				2			2	2	2	
CO2	2	3	3	3		2				2			2		2
CO3	2		2	3		2	3					2	3		2
CO4	3	3	3	3	2	2			2	1				2	2
CO5	3	3	3	3	3	2	3	2	3	3	2		3	2	2

UNIT I INTRODUCTION

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks - Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

UNIT II MODELLING, AGGREGATING AND KNOWLEDGE PRESENTATION

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

UNIT III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS

Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities - social network infrastructures and communities - Decentralized online social networks - Multi-Relational characterization of dynamic social network communities.

UNIT IV PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES

Understanding and predicting human behavior for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and counter measures.

UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS

Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks - Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks – Co Citation networks.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Peter Mika, "Social Networks and the Semantic Web", Fifth Edition, Springer 2007.
- 2 Borko Furht, "Handbook of Social Network Technologies and Applications", First Edition, Springer, 2010.

REFERENCES

- 1 Guandong Xu, Yanchun Zhang, Lin Li, "Web Mining and Social Networking – Techniques and Applications", First Edition, Springer, 2011.
- 2 Dion Goh, Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
- 3 Max Chevalier, Christine Julien, Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved User Modelling", IGI Global Snippet, 2009.
- 4 John G. Breslin, Alexander Passant, and Stefan Decker, "The Social Semantic Web", Springer, 2009.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Develop semantic web related applications
- CO2** Describe and Represent knowledge using ontology
- CO3** Inspect and Predict human behavior in social web and related communities
- CO4** Organize and Visualize social networks
- CO5** Analyze tools for detecting communities social network infrastructures

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	1			2			1			1	2		1	
CO2	1			1					2		2		3		2
CO3		3		2		3				2	1			1	
CO4	2			3						1			2		
CO5		2	3		1	2	2				1	1		1	1

Professional Elective – II

19CSE306	GPU ARCHITECTURE AND PROGRAMMING	L	T	P	J	C
		3	0	0	0	3
UNIT-I	GPU ARCHITECTURE					9

Evolution of GPU architectures – Understanding Parallelism with GPU – Typical GPU Architecture – CUDA Hardware Overview – Grids - Blocks- Threads -Warps and Scheduling – Memory Handling with CUDA: Shared Memory, Constant Memory - Global Memory and Texture Memory.

UNIT-II	CUDA PROGRAMMING	9
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Using CUDA in Practice – Multi GPU – Multi GPU Solutions – Optimizing CUDA Applications: Problem Decomposition - Memory Considerations, Transfers -Thread Usage, Resource Contentions.

UNIT-III	DESIGNING GPU BASED SYSTEMS AND ISSUES	9
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Designing GPU Based Systems - Common Problems: CUDA Error Handling - Parallel Programming Issues- Algorithmic Issues - Finding and Avoiding Errors.

UNIT-IV	HETEROGENEOUS COMPUTING WITH OpenCL	9
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Introduction to Heterogeneous Computing - Introduction to OpenCL - Platform Model - Execution Model - Kernels & Programming Model –Memory Model – Basic OpenCL Examples.

UNIT-V	UNDERSTANDING OpenCL	9
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Concurrency and Execution Model – Dissecting a CPU/GPU – Case study: Image clustering - OpenCL Profiling and Debugging.

L : 45 T : 0 P : 0 J : 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Shane Cook, CUDA Programming: —A Developer’s Guide to Parallel Computing with GPUs (Applications of GPU Computing), Second Edition, Morgan Kaufmann, 2013
- 2 David R. Kaeli, Perhaad Mistry, Dana Schaa, Dong Ping Zhang, —Heterogeneous computing with OpenCL 2.0, Third Edition, Morgan Kauffman, 2015

REFERENCES

- 1 Nicholas Wilt, —CUDA Handbook: A Comprehensive Guide to GPU Programming, Addison – Wesley, 2013.
- 2 Jason Sanders, Edward Kandrot, —CUDA by Example: An Introduction to General Purpose GPU Programming, Addison – Wesley, 2010.
- 3 David B. Kirk, Wen-mei W. Hwu, Programming Massively Parallel Processors – A Hands-on Approach, Third Edition, Morgan Kaufmann, 2016.
- 4 Aaftab Munshi, Benedict Gaster, Timothy G. Mattson, James Fung & Dan Ginsburg, “OpenCL Programming Guide”, Addison-Wesley Professional, 2011.
- 5 RyojiTsuchiyama, Takashi Nakamura, TakuroIizuka & Akihiro Asahara, “The OpenCL Programming Book”, Fixstars Corporation, 2010.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Ability to understand GPU computing architecture
- CO2** Create programs using CUDA
- CO3** Design GPU based system & identifies various CUDA issues and debugs them.
- CO4** Develop simple programs using OpenCL
- CO5** Identify efficient parallel programming patterns to solve problems

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	2										2	2	
CO2		3			3				2					2	
CO3			3										2		
CO4	2				3										
CO5	2	3	2					2						2	3

UNIT I MAC & ROUTING IN AD HOC NETWORKS

Introduction – Issues and challenges in ad hoc networks – MAC Layer Protocols for wireless ad hoc networks – Contention-Based MAC protocols – MAC Protocols Using Directional Antennas – Multiple-Channel MAC Protocols – Power-Aware MAC Protocols – Routing in Ad hoc Networks – Design Issues – Proactive -Reactive and Hybrid Routing Protocols.

UNIT II TRANSPORT & QOS IN AD HOC NETWORKS

9

TCPs challenges and Design Issues in Ad Hoc Networks – Transport protocols for ad hoc networks – Issues and Challenges in providing QoS – MAC Layer QoS solutions – Network Layer QoS solutions – QoS Model

UNIT III MAC & ROUTING IN WIRELESS SENSOR NETWORKS

9

Introduction – Applications – Challenges – Sensor network architecture – MAC Protocols for wireless sensor networks – Low duty cycle protocols and wakeup concepts – Contention-Based protocols – Schedule-Based protocols – IEEE 802.15.4 Zigbee – Topology Control – Routing Protocols

UNIT IV TRANSPORT & QOS IN WIRELESS SENSOR NETWORKS

9

Data-Centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Congestion Control in network processing – Operating systems for wireless sensor networks – Examples

UNIT V SECURITY IN AD HOC AND SENSOR NETWORKS

9

Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Anti-tamper techniques – Water marking techniques – Defense against routing attacks – Secure Ad hoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS**TEXT BOOKS**

- 1 Protocols Hai Liu, Yiu-Wing Leung, Xiaowen Chu “Ad Hoc and Sensor Wireless Networks Architectures Algorithms “ Bentham Science Publishers ,2018.
- 2 C. Siva Ram Murthy & B. S. Manoj: Ad-hoc Wireless Networks, 2ndEdition, Pearson Education, 2011

REFERENCES

- 1 Carlos De Moraes Cordeiro, Dharma Prakash Agrawal,”Ad Hoc and Sensor Networks: Theory and Applications” (3rd Edition), World Scientific Publishing, 2018.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the concepts, Network architectures and applications of ad hoc networks
- CO2** Learn the Transport layer and QoS in ad hoc networks
- CO3** Analyse the importance of MAC & Routing in Wireless Sensor Networks
- CO4** Evaluate the Transport and QoS related performance measurements of sensor networks
- CO5** Formulate the different security issues in ad hoc and sensor networks.

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1		1	2		3						3		2		
CO2						2		2		2					
CO3	2			3					2					2	
CO4	2	1						2	3			2			1
CO5			2		3		3			2		2			

19CSE308	COMPUTER GRAPHICS AND VISUALIZATION	L	T	P	J	C
		3	0	0	0	3
UNIT I	COMPUTER GRAPHICS AND OPENGL					9
Basics, Application of Computer Graphics-Input devices -Video Display Devices-Introduction to OpenGL - Coordinate reference frames, specifying two-dimensional world coordinate reference frames in OpenGL - OpenGL point & line functions - Point, line & curve attributes - OpenGL point , line attribute functions - Line, circle generation algorithms						
UNIT II	FILL AREA PRIMITIVES, 2D GEOMETRIC TRANSFORMATIONS					9
Fill area Primitives: Polygon fill-areas, OpenGL polygon fill area functions, fill area attributes, OpenGL fill-area attribute functions - 2DGeometric Transformations: Basic 2D Geometric Transformations - Inverse transformations, 2DComposite transformations, raster methods for geometric transformations, OpenGL geometric transformations function, OpenGL raster transformations.						
UNIT III	CLIPPING,3D GEOMETRIC TRANSFORMATIONS, COLOR AND ILLUMINATION MODELS					9
Clipping: point, line, polygon clipping algorithms 3DGeometric Transformations: 3D transformations, other 3D transformations, OpenGL geometric transformations functions. Color Models: Properties of light, color models, RGB and CMY color models. Illumination Models: Light sources, basic illumination models-Ambient light, diffuse reflection, specular and phong model, Corresponding openGL functions.						
UNIT IV	3D VIEWING AND VISIBLE SURFACE DETECTION					9
3DViewing: Concepts, viewing pipeline, Transformation from world to viewing coordinates - Projections - The viewport transformation and 3D screen coordinates - OpenGL 3D viewing functions - Visible Surface Detection: Classification of visible surface Detection algorithms - OpenGL visibility detection functions						
UNIT V	INPUT & INTERACTION, CURVES AND COMPUTER ANIMATION					9
Input and Interaction - Curved surfaces, quadric surfaces - OpenGL Quadric and Cubic-Surface Functions, Bezier Spline Curves, Bezier surfaces - Corresponding openGL functions.						
		L : 45	T: 0	P: 0	J: 0	Total: 45 PERIODS
TEXT BOOKS						
1 Donald Hearn and Pauline Baker, “Computer Graphics with OpenGL”(4th edition), Pearson, 2014						
REFERENCES						
1 James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, “Computer Graphics-Principles and Practice”, Second Edition in C, Pearson Education,2007						
2 F. S. Hill Jr. and S. M. Kelley, “Computer Graphics using OpenGL “(third edition), Prentice Hall, 2006						
3 Peter Shirley and Steve Marschner, Computer Graphics (first edition), A. K. Peters, 2010						
COURSE OUTCOMES						
At the end of the course student should be able to:						
CO1 Understand about the basics of graphics and openGL						
CO2 Gain Knowledge about graphics 2D transformation						
CO3 Know about 3D transformation and illumination models						
CO4 Capable of detecting the visible surfaces						
CO5 Make use of computer animation in real world applications						

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2		1								3	3	2		1
CO2	2	2	1		2						2	3	2	2	2
CO3	1	2	1	1		3	2			2		2	1	2	1
CO4	1	2	1	1	1						2	2	2	2	
CO5	3	2			1	2	1		3	1	2	1	3	2	

UNIT I	INTRODUCTION TO DIGITAL MARKETING	9
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Introduction – Origin and Development of Digital Marketing – Internet Users: Penetration and Kind of Internet Use – Digital Marketing Strategy – Digital Advertising Market in India – Digital Marketing Plan – Ethical and Legal Framework of Digital Marketing – Skills Required in Digital Marketing – Careers in Digital Marketing – Lessons from Mistakes in Digital Marketing.

UNIT II	DISPLAY ADVERTISING	9
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Introduction – Concept of Display Advertising – Digital Metrics – Types of Display Ads – What makes a Good Ad? – Display Plan – Targeting in Digital Marketing – Geographic and Language Tagging – Programmatic Digital Advertising – Ad server – Ad Exchange – Challenges Faced by Display Advertising.

UNIT III	SEARCH ENGINE ADVERTISING	9
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Introduction – Why pay for Search Advertising? – Understanding Ad Placement – Understanding Ad Ranks – Why is the Ad Rank Important – Create Your First Ad Campaign – Google Ads Account – Best Practices for Creating Effective Ads – Enhance Your Ad Campaign – Performance Reports – E-Commerce.

UNIT IV	SEARCH ENGINE OPTIMIZATION	9
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Introduction – Search Engine – The Concept of SEO – SEO Phases – Website Audit – On-Page Optimization – Off-Page Optimization – Social Media Reach – Google Search Engine – Local Social SEO – Google My Business – SEO for Answer Boxes – SEO-Visual Search.

UNIT V	SOCIAL MEDIA MARKETING AND ITS TOOLS	9
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Introduction to Social Media Marketing – Content Marketing - Email marketing - Mobile marketing - Pay Per Click – CRO - Web Analytics - Facebook Marketing – Pinterest – Twitter – LinkedIn – YouTube - Google AdWords - Google Analytics.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Seema Gupta, Digital Marketing, Second Edition, McGraw Hill Education Private Limited, 2020.

REFERENCES

- 1 Puneet Singh Bhatia, Fundamentals of Digital Marketing, Second Edition, Pearson, 2019.
- 2 Stephanie Diamond, Digital Marketing All - In - One For Dummies, A Wiley. 2019
- 3 Sean Dollwet, Social Media Marketing 2019: How to Reach Millions of Customers Without Wasting Your Time and Money, 2019.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the different aspects of digital marketing with its foundation
- CO2** Learn the various concepts of Digital advertising to map the customer needs
- CO3** Analyse the importance of Ad rank and best practices in Search Engine advertising
- CO4** Examine how to increase the targeted traffic of customer website using SEO
- CO5** Formulate the different social media marketing strategies with its tools

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3		2	2		3				2			3		
CO2	2	3			1		2					2	1		
CO3	3			3			3	2		2	1			3	2
CO4	3			1		2			3						1
CO5	3		2					3		2	3			2	

UNIT I INTRODUCTION TO GRID**9**

Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers – Grid computing Infrastructures – cloud computing – service oriented architecture – Introduction to Grid Architecture and standards – Elements of Grid – Overview of Grid Architecture.

UNIT II CLOUD COMPUTING**9**

Origins of Cloud computing – Cloud components - Essential characteristics – On-demand selfservice, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.

UNIT III VIRTUALIZATION**9**

Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation

UNIT IV PROGRAMMING MODEL**9**

Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model – Introduction to Hadoop Framework – Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

UNIT V SECURITY**9**

Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud. Case study :

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS**TEXT BOOKS**

- 1 Tiffany Vance, Nazila Merati “Cloud Computing in Ocean and Atmospheric Sciences” 2016.
- 2 Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, “Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet”, First Edition, Morgan Kaufman Publisher, Elsevier, 2012.

REFERENCES

- 1 Jason Venner, “Pro Hadoop- Build Scalable, Distributed Applications in the Cloud”, A Press, 2009.
- 2 Daniel Minoli, “A Networking Approach to Grid Computing”, John Wiley Publication, 2005
- 3 Greg Conti, “Security Data Visualization: Graphical Techniques for Network Analysis”, No Starch Press Inc, 2007.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1 Understand the traditional computing architecture and distributed computing
- CO2 Understand how the distributed computing environments known as Grids can be built from lower level services
- CO3 Apply the virtualization in distributed computing and enabling the development of cloud computing
- CO4 Analyze the performance and cloud computing
- CO5 Examine the cloud and grid security at various levels

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	3		1	2				1		2	3		
CO2	3	3	2	1		2	2			2		2	2		
CO3	3	2	3		2	1			1	3	1	2		3	2
CO4	2	2	3	2	2		1	1	1	2		1		3	
CO5	1		1		2	2		3	2	2	3	2		3	

Professional Elective - III

19CSE311

DATA VISUALIZATION (Common to CSE & IT)

L	T	P	J	C
2	0	2	0	3
				6+6

UNIT I INTRODUCTION

Context of data visualization – Definition, Methodology, Visualization design objectives. Key Factors – Purpose- Visualization function and tone -Visualization design options – Data representation -Data Presentation - Seven stages of Data visualization - widgets - Data visualization tools.

Lab Experiment:

1. Create a program to visualize a graph in R
2. Draw a Scatter plot in R

UNIT II VISUAL ANALYTICS

6+6

Mapping - Time series - Connections and correlations - Scatterplot maps – Trees- Hierarchies and Recursion - Networks and Graphs- Info graphics.

Lab Experiment:

1. Write a program to Plot a line in R and R Statistics
2. Implement a program to draw a Piecharts and Bar charts in R

UNIT III DATA PROCESS

6+6

Acquiring data - Where to Find Data-Tools for Acquiring Data from the Internet-Parsing data - Levels of Effort- Tools for Gathering Clues- Text is Best - Text Markup Languages - Regular Expressions (regexps) - Grammars and BNF Notation - Compressed Data - Vectors and Geometry - Binary Data Formats - Advanced Detective Work

Lab Experiment:

1. Environmental Setup of the Tableau
2. Write a program to Work on the Data sets of Tableau

UNIT IV INTERACTIVE DATA VISUALIZATION

6+6

Drawing with data – Scales – Axes – Updates- Transition and Motion – Interactivity - Layouts – Geo-mapping – Exporting - Framework.

Lab Experiment:

1. Write a program to draw a Gantt chart using Tableau
2. Write a program to Create a Box plot using Tableau

UNIT V VISUALIZATION TOOLS

6+6

Introduction to Various data visualization tools: Tableau, D3.js, Gephi. Visualization Dashboard Creations: Dashboard creation using visualization tools for the use cases: Finance-marketing-Insurance-Healthcare.

Lab Experiment:

1. Working on free open source Visualization tools.
2. Write a program to Visualize the Dashboard using Tableau

L : 30 T: 0 P: 30 J: 0 Total: 60 PERIODS

TEXT BOOKS

1. Christian Toninski, Heidrun Schumann, Interactive Visual Data Analysis, CRC press publication, 2020
2. Aragues, Anthony. Visualizing Streaming Data: Interactive Analysis Beyond Static Limits. O'Reilly Media, Inc., 2018

REFERENCES

1. Scott Murray, "Interactive data visualization for the web", O'Reilly Media, Inc., 2013.
2. Tamara Munzner, Visualization Analysis and Design, CRC Press 2014.
3. Greg Conti, "Security Data Visualization: Graphical Techniques for Network Analysis", No Starch Press Inc, 2007.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the various types of data and the principles of data visualization.
- CO2** Identify the structured approach to create visualization
- CO3** Analyze the data acquiring and processing
- CO4** Use various methodologies present in data visualization
- CO5** Create interactive visualization for better insight using various visualization tools

CO/PO Mapping															
(S/M/W indicates strength of correlation) 3 Strong, 2 Medium, 1 Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2								1		3		2		
CO2		2			2			2				2		1	
CO3	2		3							2	3		2		3
CO4	1		3	3							2		2		
CO5		2	3	3		2	2	3		2				2	

UNIT I DATA MINING**6+6**

Data–Types of Data–, Data Mining Functionalities– Patterns– Classification of Data Mining systems– Data mining Task primitives –Integration of Data mining system with a Data warehouse–Major issues in Data Mining–Data Preprocessing

Lab Practice: [By using Weka Explorer]

- 1.Demonstration of preprocessing on dataset student.arff
- 2.Demonstration of preprocessing on dataset labor.arff

UNIT II ASSOCIATION RULE MINING**6+6**

Mining Frequent Patterns–Associations and correlations – Mining Methods– Mining Various kinds of Association Rules– Correlation Analysis– Constraint based Association mining. Graph Pattern Mining, SPM (Sequential Pattern Mining)

Lab Practice:[By using Weka Explorer]

- 1.Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm
- 2.Demonstration of Association rule process on dataset test.arff using apriori algorithm

UNIT III CLASSIFICATION AND CLUSTERING**6+6**

Classification and Prediction – Basic concepts–Decision tree induction–Bayesian classification, Rule–based classification, Cluster analysis–Types of Data in Cluster Analysis–Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Grid–Based Methods, Outlier Analysis

Lab Practice:[By using Weka Explorer]

1. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
2. Demonstration of clustering rule process on dataset iris.arff using simple k-means
3. Demonstration of clustering rule process on dataset student.arff using simple k-means

UNIT IV TEXT MINING**6+6**

Introduction-Predictive Analysis-Text Representation-Machine learning algorithm-Exploratory Analysis-Sentiment analysis-Text based forecasting-Information Extraction. Case Study: Voice of Customer

Lab Practice:

1. You have a product that was launched a while ago and you have also kept the track of all the reviews, that the product got on all the platforms across the internet. And what you have is unstructured text data and do the text classification on this unstructured text data using NLP and machine learning.
2. Demonstration of association between data and finding frequent item set in text mining using Weka Explorer

UNIT V WEB MINING**6+6**

Introduction-Information Retrieval and Web Search-Hyperlink Based Ranking-Clustering approaches for Web Mining-Evaluating Clustering-Classification approaches for Web Mining. Case Study: Retail industry, Health care.

Lab Practice:[By using Weka Explorer]

1. Demonstration of Web mining technique clustering algorithm for the data set.

L : 30 T: 0 P: 30 J: 0 Total: 60 PERIODS

TEXT BOOKS

- 1 Jiawei Han & Micheline Kamber “Data Mining – Concepts and Techniques”, 3rd Edition Elsevier,2012
- 2 Margaret H Dunham, “Data Mining Introductory and Advanced topics”, PEA.2008

REFERENCES

- 1 Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the data mining Functionalities
- CO2** Learn Mining methods to make decisions
- CO3** Familiarize with data mining algorithms
- CO4** Analyze the concepts of text representation
- CO5** Apply the data mining approaches in web search

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2			1	1		2		2	1	1	2	2	1
CO2		3	2				2	2					2	1	1
CO3	3	3	2	2	2	2	2				1	2	3	2	1
CO4	2			1									1		
CO5	2	1		1		3		2		1		1			

UNIT I INTRODUCTION TO OPTIMIZATION TECHNIQUES**6+6**

Introduction –Single variable optimization-Constrained and unconstrained multivariable optimization-statement of Optimization problem – Design vector – Design constraints – constraint surface – Objective function –Classification of Optimization problems

Lab Practice:

1. Installation of Mat lab and their packages.
2. Write a program to implement the data types ,variables and commands

UNIT II LINEAR PROGRAMMING**6+6**

Formulation of linear programming model-Graphical solution–solving LPP using simplex algorithm – Revised Simplex Method- Dual simplex method – Sensitivity analysis–Transportation problems– Assignment problems-Traveling sales man problem

Lab Practice:

1. Write a program to implement a Traveling Sales man Problem using LP
2. Write a Program to import the data using matlab

UNIT III NON LINEAR PROGRAMMING**6+6**

Classification of Non Linear programming – Lagrange multiplier method – Karush – Kuhn Tucker conditions–Reduced gradient algorithms–Quadratic programming method – Penalty and Barrier method.

Lab Practice:

1. Write a program on the searching methods using NLP
2. Write a program for to implement the data output using matlab

UNIT IV DYNAMIC PROGRAMMING**6+6**

Introduction – Multistage decision processes– Principles of optimality – Decision trees – Computation procedures.

Lab Practice:

1. Write a program for the decision trees using a dynamic Programming
2. Write a program for implementing the looping statement using matlab

UNIT V SIMULATION MODELLING USING MATLAB**6+6**

Introduction & steps of simulation method, distribution functions and random number generation-Unrestricted Search methods-Golden Section Methods-Fibonacci Methods

Lab Practice:

1. Write a program to to implement a fibonaacci methods
2. Write a program for the create a string using matlab

L : 30 T: 0 P: 30 J: 0 Total: 60 PERIODS**TEXT BOOKS**

- 1 Rao S. S. – ‘Engineering Optimization, Theory and Practice’, New Age International Publishers ,4th Edition 2012 .

REFERENCES

- 1 Deb K. “Optimization for Engineering Design Algorithms and Examples”, PHI, 2000.
- 2 Hardley G. -‘Linear Programming’ – Narosa Book Distributors Private Ltd.,2002
- 3 George Bernard Dantzig, Mukund Narain Thapa, “Linear programming”, Springer series in operations research 3rd edition, 2003
- 4 Kalynamoy Deb, “Optimization for Engineering Design, Algorithms and Examples”, Prentice Hall, 2004.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understanding the Concept of optimization and classification of optimization problems
- CO2** Solve the Linear Programming models using graphical and simplex methods.
- CO3** Formulating and solving nonlinear optimization problem
- CO4** Apply dynamic programming to optimize multi stage decision problems.
- CO5** Learn efficient computational procedures to solve optimization problems.

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	3	2	3	3		2	2	2	2		2	3		2
CO2	3	3		2	2				2	2			2		
CO3	3	2		3	2					2			2		
CO4	2	2	2	2					2	2	2		2	2	2
CO5	2	3		2	3	2	2		2	2		3	3	2	2

UNIT I INTRODUCTION**6+6**

Notion of Community-Guidelines for effectively working with FOSS community- Benefits of Community based Software Development --Requirements for being open, free software, open source software --Four degrees of freedom - FOSS Licensing Models - FOSS Licenses – GPL- AGPL-LGPL - FDL - Implications – FOSS examples.

Lab Practice

- 1.NS2 Installation
- 2.Simple TCL Commands

UNIT II OPEN SOURCE PROJECTS**6+6**

Introduction to github – Interacting with the community on github – Communication and etiquette – testing open source code – Reporting Issues – Contributing Code – Case Studies –Wikipedia – Drupal – Wordpress – GCC – GDB

Lab Practice

- 1.Create a repository on github and save versions of your project.
- 2.Using GitHub to Collaborate : Get practice using GitHub or other remote repositories to share your changes with others and collaborate on multi-developer projects.

UNIT III UNDERSTANDING OPEN SOURCE ECOSYSTEM**6+6**

Open Source Operating System : GNU/Linux, Andriod, Free BSD, open Solaris. Open Source Hardware – Containerization Technologies – Docker, Development Tools, Debuggers, Programming Languages, LAMP

Lab Practice

- 1.Installation and Configuration of LAMP in Linux
- 2.Creating simple Database in MySQL server Performing Queries

UNIT IV PROGRAMMING TOOLS AND TECHNIQUES**6+6**

Usage of design Tools like Argo UML or equivalent, Version Control Systems like Git or equivalent, – Bug Tracking Systems- Package Management Systems

Lab Practice

- 1.Installation of Argo UML
- 2.Create a Class Diagram using Argo UML

UNIT V FOSS CASE STUDIES**6+6**

Open Source Software Development - Case Study – Libreoffice –Samba

Lab Practice

- 1.Install Samba
- 2.Share files to windows

L : 30 T: 0 P:3 0 J: 0 Total: 60 PERIODS**TEXT BOOKS**

- 1 James Lee and Brent Ware , "Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", , Dorling Kindersley(India) Pvt. Ltd, 2008.
- 2 Charles Brown, "Free Open Source Software", 2015

REFERENCES

- 1 Eric Rosebrock, Eric Filson , "Setting Up LAMP: Getting Linux, Apache, MySQL, and PHP and working Together", Published by John Wiley and Sons, 2004.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the difference between open source software and commercial software
- CO2** Identify, install and run Linux Operating System
- CO3** Understand the web application development using Apache
- CO4** Develop web applications
- CO5** Work with programming tools

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	3	2	3	3		2	2	2	2		2	3		2
CO2	2	2	1	2	3		1	1					1		
CO3	2	2	2		2									1	2
CO4	2	1	2			1		2		1	1		2		2
CO5		2	2	1	3		2		1			1		2	

UNIT I UI DESIGN FUNDAMENTALS**6+6**

Evolution of user interfaces - Interaction with physical components - Flat design - Role of UI in UX - Laws of digital interface design - Understand user experience, VIMM model, Difference between design and art; emotional design; designing for mental models;

Lab Practice:

- Study on Importance of presentation, content, interactions, screen elements, accessibility during UI design
- Identifying Good vs. bad UX design in the existing websites/Apps
- Learn the basics of Figma – An UI/UX tool

UNIT II TYPOGRAPHY**6+6**

Types of typefaces, Typography Terminology, Guidelines for proper type selection - Typography design - Analyzing Aesthetics as per laws of Design principles - Alignment - Spacing - Lighting & Shadows – Grids. Design for platforms: Mobile, Web - Mood boards

Lab Practice:

- Applying Text box behaviour such as auto width, auto height and fixed-size in Figma
- Creating and managing components in Figma
- Use text, shapes, and images to create a story using the Frames in a file using Figma.

UNIT III UX & ITS ELEMENTS OF DESIGN**6+6**

User Interaction - Cognitive Model - Mental Model - UX design laws and its uses - Elements used in User Experience Design - How it works together - Big Picture - Persona in UX Design - Stages for design in UX - Heuristic Evaluation - Case Studies of Competitor

Lab Practice:

- Applying buttons, icons, images, colors, and type styles for you to use to design the page with Figma
- Creating various color and text styles in Figma

UNIT IV UX DESIGN PROCESS**6+6**

Research in User Experience Design -Tools and Method used for Research: creating a design strategy, Profiles, and personas, understanding psychographic and demographics, Data gathering methods, Scenario, and task analysis, writing a user story, and designing, Mind Maps, Information architecture, wireframes

Lab Practice:

- Importing pictures/photographs into Figma
- Creating Artboard in Figma

UNIT V MODELING THE EXPERIENCE AND DESIGN COMPONENTS**6+6**

Design Testing Methods and Techniques. - Usability Testing – Types and Process - Create plan for the Usability. - Prototype and wireframing -Various Prototyping Tools and preparing Usability Tests - Refine.

Lab Practice:

- Creating prototypes and performing testing in Figma
- Create structuring information on a page that will enable creating the content of your Curriculum Vitae in Figma

L : 30 T: 0 P: 30 J: 0 Total: 60 PERIODS

TEXT BOOKS

- 1 Kevin P. Nichols, Donald Chesnut ,”UX For Dummies”, Wiley,2014
- 2 Weathers David, “UX/UI Design 2021 For Beginners: A Simple Approach to UX/UI Design for Intuitive Designers” ,2021

REFERENCES

- 1 Branson Steven , “UX / UI Design: Introduction Guide To Intuitive Design and User-Friendly Experience” , 2020
- 2 Anderson Gail, “The Typography Idea Book: Inspiration from 50 Masters”, 2016
- 3 Slade-Brooking Catharine , “Creating a Brand Identity: A Guide for Designers:(Graphic Design Books, Logo Design, Marketing”, 2016

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the design fundamentals of user interfacing
- CO2** Learn the various interfaces and typography for user interfacing
- CO3** Analyse the elements of UX design to make it work together
- CO4** Examine the user experience and perform data gathering for design process
- CO5** Formulate ideas for various app designs and website pages.

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3									1			3		
CO2			1				2		1						
CO3		3				2		3						2	
CO4				2					3		2				
CO5					1							2			3

Professional Elective - IV

19MEE301	ENGINEERING ECONOMICS AND COST ANALYSIS	L	T	P	J	C
		3	0	0	0	3
UNIT I	BASIC ECONOMICS					9

Definition of economics - nature and scope of economic science - nature and scope of managerial economics - basic terms and concepts - goods - utility - value - wealth - factors of production - land - its peculiarities - labour - economies of large and small scale - consumption - wants - its characteristics and classification - law of diminishing marginal utility

UNIT II	DEMAND AND SCHEDULE	9
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Demand - demand schedule - demand curve - law of demand - elasticity of demand - types of elasticity - factors determining elasticity - measurement - its significance - supply – supply schedule - supply curve - law of supply - elasticity of supply - market price and normal price - perfect competition - monopoly – monopolistic competition.

UNIT III	ORGANISATION	9
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Forms of business - proprietorship - partnership - joint stock company - cooperative organization - state enterprise - mixed economy - money and banking - banking - kinds - commercial banks - central banking functions - control of credit - monetary policy - credit instrument.

UNIT IV	FINANCING	9
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Types of financing - Short term borrowing - Long term borrowing - Internal generation of funds - External commercial borrowings - Assistance from government budgeting support Profit and Loss account - Funds flow statement – Case Study on Inflation

UNIT V	COST AND BREAK-EVEN ANALYSIS	9
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Types of costing – traditional costing approach - activity base 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 –internal rate of return – payback period – net present value. Break even analysis - basic assumptions – break even chart – managerial uses of break-even analysis.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 John A.White, Kenneth E Case, David B Pratt, Principles of Engineering Economic Analysis, Fifth edition, Wiley India Edition., 2015
- 2 D.M.Mithani, Suresh Chandra Das, Engineering Economic and Costing, Himalaya publishing House, 2017.

REFERENCES

- 1 Barthwal R.R., Industrial Economics - An Introductory Text Book, New Age, 2007
- 2 R.Paneerselvam, Engineering Economics, PHI Learning Private limited, 2013
- 3 R.Kesavan, C.Elanchezhian, T.Sundar Selwyn, Engineering Economics and Financial Accounting, Lakshmi Publications (P) LTD, 2012
- 4 Tahir Hussain, Engineering Economics, University science Press, 2010
- 5 David Whitman, Ronald E. Terry, Fundamentals of Engineering Economics and Decision Analysis, Morgan & Claypool Publishers, 2012

COURSE OUTCOMES

At the end of the course student should be able to:

CO1 Recognize about the fundamentals of economics

CO2 Describe about the demand and schedule of the market

CO3 Framework about the organization process

CO4 Develop the financial statement

CO5 Summarize the cost and break even analyses of the system

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1			2		2					3			2		
CO2	2	3		3		2					2		2		2
CO3		2	1	3		2	2					2	3		2
CO4	2	1	2	2					2					2	
CO5	3	1	3	2	2		2		2	2			3	2	

19CSE401	SOFTWARE PROJECT MANAGEMENT	L	T	P	J	C
		3	0	0	0	3
UNIT I	INTRODUCTION					9

Importance of Software Project Management – Software engineering problem and software product- software product attributes, Definition of a Software Project (SP)- SP Vs. other types of projects activities covered by SPM, categorizing SPs- Project management cycle- SPM framework - types of project plan.

UNIT II	PROJECT ANALYSIS	9
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Introduction- strategic assessment and technical assessment - economic analysis- Present worth- future worth- annual worth-Internal Rate of Return (IRR) method- benefit-cost ratio analysis- Including uniform gradient cash flow and comparison of mutually exclusive alternatives.

UNIT III	ACTIVITY PLANNING AND RISK MANAGEMENT	9
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Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules.

UNIT IV	PROJECT MANAGEMENT AND CONTROL	9
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Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management.

UNIT V	STAFFING IN SOFTWARE PROJECTS	9
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Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Bob Hughes, Mike Cotterell and Rajib Mall: “Software Project Management”, Fifth Edition, Tata McGraw Hill, New Delhi, 2016.

REFERENCES

- 1 Robert K. Wysocki “Effective Software Project Management “Wiley Publication, 2011.
- 2 Walker Royce “Software Project Management” Addison-Wesley 2012.
- 3 Gopalaswamy Ramesh, ”Managing Global Software Projects” McGraw Hill Education (India), Fourteenth Reprint 2013.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand project management concepts.
- CO2** Obtain adequate knowledge about software process models and software effort estimation
- CO3** Estimate the risks involved in various project activities
- CO4** Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.
- CO5** Gain extensive knowledge about managing people and organizational structures.

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2							3			3		2		
CO2		2		2		3					2			2	
CO3				2							3		2	2	
CO4			2			3				2	3			1	
CO5					3				2			2			2

UNIT I INTRODUCTION TO VIRTUAL REALITY**9**

Introduction to Virtual Reality - Fundamental Concept and Components of Virtual Reality - Primary Features and Present Development on Virtual Reality - Multiple Modals of Input and Output Interface in Virtual Input - Tracker, Sensor, Digital Glove, Movement Capture, Video-based 3D Menus & 3DScanner etc; Output - Visual / Auditory / Haptic Devices.

UNIT II VISUAL COMPUTATION IN VIRTUAL REALITY**9**

Visual Computation in Virtual Reality - Fundamentals of Computer Graphics - Real time rendering technology - Principles of Stereoscopic Display - Software and Hardware Technology on Stereoscopic Display - Environment Modeling in Virtual Reality Geometric Modeling - Behavior Simulation - Physically Based Simulation.

UNIT III HAPTIC & FORCE INTERACTION IN VIRTUAL REALITY**9**

Haptic & Force Interaction in Virtual Reality Concept of haptic interaction - Principles of touch feedback and force Feedback - Typical structure and principles of touch/force feedback facilities in applications.

UNIT IV VR DEVELOPMENT TOOLS**9**

VR Development Tools - Frameworks of Software Development Tools in VR – Modeling Tools for VR - X3D Standard; Vega, MultiGen, Virtools.

UNIT V AUGMENTED REALITY**9**

Augmented Reality - System Structure of Augmented Reality - Key Technology in AR - General solution for calculating geometric & illumination - consistency in the augmented environment.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS**TEXT BOOKS**

- 1 Burdea, G. C. and P. Coffet. Virtual Reality Technology, Third Edition. Wiley-IEEE Press, 2020.

REFERENCES

- 1 William Sherman, Alan Craig, Understanding Virtual Reality – Interface, Application, and Design, Second Edition, Elsevier, 2018.
- 2 Jesse Glover and Jonathan Linowes, Complete Virtual Reality & Augmented Reality Development with Unity, April 2019.
- 3 Paul Mealy Virtual & Augmented Reality, John Wiley & sons Inc, 2018.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Know the basic concept of AR
- CO2** Understand the principles and multidisciplinary features of virtual reality.
- CO3** Familiarize with the technology for multimodal user interaction and perception in VR, in particular the visual, audial and haptic interface and behavior.
- CO4** Experiments with the technology for managing large scale VR environment in real time.
- CO5** Know the basic concept of Augmented Reality.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1		2					2						2		
CO2		2											2		
CO3	2		2		2		2						2		
CO4			3	2	3	2			2		1	3		1	1
CO5		2													

UNIT I INTRODUCTION TO BIG DATA AND ANALYTICS**9**

Classification of Digital Data, Structured and Unstructured Data - Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data - Why Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop Environment

Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments - Basically Available Soft State Eventual Consistency - Top Analytics Tools

UNIT II INTRODUCTION TO TECHNOLOGY LANDSCAPE**9**

NoSQL, Comparison of SQL and NoSQL, Hadoop - RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

UNIT III INTRODUCTION TO MONGODB AND CASSANDRA**9**

MongoDB: Why Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language

Cassandra: Features - CQL Data Types – CQLSH – Keyspaces - CRUD Operations – Collections - Using a Counter - Time to Live - Alter Commands - Import and Export - Querying System Tables

UNIT IV INTRODUCTION TO MAPREDUCE PROGRAMMING AND HIVE**9**

MapReduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression

Hive: Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements – Partitions – Bucketing – Views – Sub - Query – Joins – Aggregations - Group by and Having – RC File Implementation - Hive User Defined Function - Serialization and Deserialization - Hive Analytic Functions

UNIT V INTRODUCTION TO PIG & JASPERREPORTS**9**

Pig: Introduction - Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - Piggy Bank - User-Defined Functions - Parameter Substitution - Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive – JasperReport using Jaspersoft

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS**TEXT BOOKS**

- 1 Seema Acharya, Subhashini Chellappan, “Big Data and Analytics”, Wiley Publications, First Edition, 2015

REFERENCES

- 1 Judith Huruwitz, Alan Nugent, Fern Halper, Marcia Kaufman, “Big data for dummies”, John Wiley & Sons, Inc. (2013)
- 2 Tom White, “Hadoop The Definitive Guide”, O’Reilly Publications, Fourth Edition, 2015
- 3 Dirk Deroos, Paul C.Zikopoulos, Roman B.Melnky, Bruce Brown, Rafael Coss, “Hadoop For Dummies”, Wiley Publications, 2014
- 4 Robert D.Schneider, “Hadoop For Dummies”, John Wiley & Sons, Inc. (2012)
- 5 Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill, 2012

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Explore the big data landscape and analytics
- CO2** Demonstrate the hadoop platform for processing massive volume of data
- CO3** Implement CRUD operations using MongoDB and Cassandra
- CO4** Apply MapReduce framework and Hive
- CO5** Analyze big data using pig and prepare reports using Jasper soft studio

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1		2		1	3		2							2	
CO2	3	3		2	1								3	3	
CO3			3	2	2					1					3
CO4						2			3					2	
CO5				3	3			1			1	2			3

UNIT I GREEN COMPUTING AND THE ENVIRONMENT 9

Key concepts – Environmental Drivers for green computing – Greenability and Cloud Computing – Philosophical Implications of green computing – Zen of Green Computing

UNIT II GREEN ASSETS AND MODELING 9

Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

UNIT III GREEN DATA CENTERS FOR SAVING ENERGY 9

Key concepts – saving energy serves many masters – cost savings through energy savings – risk reduction through energy savings – embodied energy – energy saving pilot projects – selling energy saving

UNIT IV GREEN CLOUD COMPUTING 9

Green computing – Green data center – Goals of green computing – Benefits of going ‘green’ - Green cloud computing – Green cloud – Techniques to make the cloud ‘green’ – Balancing Energy in Data Centers

UNIT V CASE STUDIES 9

The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Bhuvan Unhelkar, “Green IT Strategies and Applications-Using Environmental Intelligence”, CRC Press, June 2014.
- 2 Woody Leonhard, Katherine Murray, “Green Home computing for dummies”, August 2012.

REFERENCES

- 1 Alin Gales, Michael Schaefer, Mike Ebbers, “Green Data Center: steps for the Journey ”Shroff/ IBM rebook, 2011.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand about the basic concepts of Green Computing
- CO2** Enhance the skill in energy saving practices in their use of hardware.
- CO3** Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders.
- CO4** Understand the deep knowledge about green cloud computing
- CO5** Applications of Green cloud computing in real world applications

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3			2			3		2			3	3		
CO2		3			2	2								2	
CO3			2					2				3			2
CO4		3			1				2		3			1	

CO5			2							1				3	2
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Open Elective Courses

19CSO301	ANDROID APPLICATION DEVELOPMENT	L	T	P	J	C
		3	0	0	0	3
UNIT I	JAVA BASICS					8

Introduction- java coding for Android Studio- Variables in Java- Decision Statements in java- Loops - methods in java- classes- inheritance and objects in java.

UNIT II	INTRODUCTION TO ANDROID	9
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Android Operating System, working of android application, Programming Language used for developing Android Applications, Installation of Android Studio, setting up emulator working environment, General procedure for developing app.

UNIT III	FIRST ANDROID APP	10
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Creating a new android project - Developing User interface- Writing main code of the app in java file- Building and Running the App.

UNIT IV	APPLICATION STRUCTURE	9
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Android Manifest.xml-uses permission & uses sdk- Resources- Layouts & Drawable Resources- Activities and Activity lifecycle.

UNIT V	ANDROID VIRTUAL DEVICE	9
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Adding and Positioning text views, Adding widgets, Adding and Positioning the button-Developing main code- Build the app in virtual emulator- Launching emulator. Case Study - Challenges in Mobile app development for Location Based Services.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 J. Paul Cardle, “ Android App Development in Android Studio” First Edition, Manchester Academic Publisher,2017

REFERENCES

- 1 Joseph Annuzzi Jr., Lauren Darcey and Shane Conder, Introduction to Android Application Development: Android Essentials, Addison-Wesley Professional, 2013
- 2 Neil Smyth, Android Studio Development Essentials, CreateSpace Independent Publishing Platform, 2016.
- 3 Sam Key, Android Programming in a Day, CreateSpace Independent Publishing Platform, 2015
- 4 Barry A. Burd, Android Application Development All-in-One For Dummies, For Dummies, 2015.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Get knowledge about android studio programming language
- CO2** Get elementary idea about the android phone
- CO3** Develop UI to build application
- CO4** Get familiarity about structure of app development
- CO5** Set up virtual mobile emulator in android studio

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
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CO1	3		3		3	2		3	2		2		3		
CO2	2	3		3		3	2			2		2		3	
CO3	3		3	2	2	2	3	3			3			3	
CO4	2	3		2			2				2				2
CO5	2	2		3		2			2					3	

19CSO302	INTRODUCTION TO DATA ANALYTICS	L	T	P	J	C
		3	0	0	0	3
UNIT I	INTRODUCTION					9

Data Science Process: Roles and stages in a data science project, Working with files and databases, Exploring and managing data; Big Data- Types, Characteristics, Tools and Applications; Data Analytics- Types, Tools and Applications; Data and Relations: Data set - Data Scales - Set and Matrix Representations - Relations - Similarity Measures - Dissimilarity Measures - Sequence Relations – Sampling and Quantization.

UNIT II PREPROCESSING AND VISUALIZATION 9

Data preprocessing : Error Types - Error Handling - Filtering - Data Transformation - Data Merging; Data visualization: Diagrams - Principal Component Analysis - Multidimensional Scaling - Auto Associator - Histograms - Spectral Analysis.

UNIT III CORRELATION AND REGRESSION 9

Correlation: Linear Correlation - Causality - Chi-Square Tests; Regression: Linear Regression - Robust Regression - RBF Networks - Cross Validation - Feature Selection

UNIT IV CLASSIFICATION 9

Classification: Classification Criteria - Naive Bayes' Classifier -Rule Based Classification – Classification by Back Propagation - Support Vector Machine - Decision Trees - Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy.

UNIT V CLUSTERING 9

Clustering: Cluster Partitions - Sequential - Prototype-Based - Fuzzy - Relational - Cluster Tendency Assessment - Cluster Validity - Self Organizing Maps; Case Study: Advertising on the Web.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Runkler TA, “Data Analytics: Models and algorithms for intelligent data analysis”, Springer, Third Edition 2020.

REFERENCES

- 1 Dean J, “Big Data, Data Mining and Machine learning”, Wiley publications, 2014.
- 2 Provost F and Fawcett T, “Data Science for Business”, O'Reilly Media Inc, 2013.
- 3 Janert PK, “Data Analysis with Open Source Tools”, O'Reilly Media Inc, 2011.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understanding the basics of Data Science, Big Data, Data Analytics, Data and its Relations
- CO2** Familiar with the Pre-processing and Visualization techniques by using given data sets.
- CO3** Analyse the correlation and regression concepts with suitable examples
- CO4** Apply classification models on a given data sets.
- CO5** Apply the techniques of clustering in real world data.

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3			1	2							1	2		
CO2	2		1	1	3		2			2	2	2	3	1	2
CO3		3	2	3	2		1			1		2	3	2	2
CO4		2	2	2	2	3	2			2	2	2	3	2	2
CO5		2	2	2	2	3	2			2	2	2	3	2	2

UNIT I WEB CONCEPTS AND HTML BASICS**9**

Fundamentals of web concepts – The Web Programmer's Toolbox – HTML- Structure of HTML-Basic HTML Tags-Advanced HTML Tags-Difference between HTML & DHTML-DHTML Basic tags- Introduction to Doc Types-Creating Simple HTML Pages

UNIT II CSS and JAVA SCRIPT**9**

Introduction to CSS-Types of style sheets-Types of CSS Selectors-Complete CSS properties-Converting Table layout to CSS-Creating simple and dropdown menus-Introduction to Java Script -Types of Java Scripts-Variables- operators, loops-Objects- Events and DOM-Common java script functions-Using Java script in Dreamweaver.

UNIT III XML AND XSLT**9**

Introduction to XML – Syntax – Document Structure – Document Type Definitions –Namespaces– Schemas–Displaying Raw XML Documents–Displaying XML Documents with CSS – XSLT Style Sheets – XML Processes

UNIT IV PHP and MYSQL**9**

Introduction to PHP – Origin and Uses of PHP – Overview -Characteristics– Primitives,Operations,andExpressions–Output–ControlStatements –Arrays–Functions–Pattern Matching – Form Handling – Files–Session Tracking–Database Access Through the Web–Relational Databases– SQL–Architectures for Database Access –MySQL Database System.

UNIT V WEB SERVICES**9**

Introduction to Web service -Transport protocols for web services – messaging with web services - protocols - SOAP - describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Case Study : Web Hosting(By FTP) and Front End Development Tools –Web API

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS**TEXT BOOKS**

- 1 Robert W. Sebesta, "Programming the World Wide Web", Pearson, 2014
- 2 Deitel and Deitel and Nieto, "Internet and World Wide Web How to Program", Fifth Edition, Prentice Hall, 2016

REFERENCES

- 1 Achyut S. Godbole, Atul Kahate, "Web Technologies", Second Edition, Tata Mc Graw Hill Publications, 2011.
- 2 D.P. Nagpal, "Web Design Technology", S. Chand & Company Ltd, 2009.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the fundamentals of Web Concepts
- CO2** Build website with HTML and apply the styles to it using CSS.
- CO3** Design and implement the XML and Web Concepts.
- CO4** Utilize PHP to retrieve data from database and to present it in XML format.
- CO5** Gain Exposure in web services and protocols

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3		3	2	2	3					3	2	3		
CO2	3	3	3	2	2		3				2			3	
CO3	2		3	2	3			3						3	
CO4	2		3	3	3	3		3		2					2
CO5	2	3		2	2							3	3		

UNIT I INTRODUCTION TO CYBER LAW

Evolution of computer technology, emergence of cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.

UNIT II INFORMATION TECHNOLOGY ACT

Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature, Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.

UNIT III CYBER LAW AND RELATED LEGISLATION

Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Sections of Indian Penal Code, Relevant Sections of Reserve Bank of India Act, Law Relating To Employees And Internet, Alternative Dispute Resolution , Online Dispute Resolution (ODR).

UNIT IV ELECTRONIC BUSINESS AND LEGAL ISSUES

Evolution and development in E-commerce, paper vs paper less contracts E-Commerce models- B2B, B2C, E security. Business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends.

UNIT V CYBER ETHICS

The Importance of Cyber Law, Significance of cyber Ethics, Need for Cyber regulations and Ethics. Ethics in Information society, Introduction to Artificial Intelligence Ethics: Ethical Issues in AI and core Principles, Introduction to Block chain Ethics.

L : 45 T : 0 P : 0 J : 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Cyber Law and Ethics: Regulation of the Connected World, Mark Grabowski (Author) & Eric P. Robinson (Author), Routledge; 1st edition ,2021

REFERENCES

- 1 Debby Russell and Sr. G. T Gangemi, "Computer Security Basics ", 2nd Edition, O' Reilly
- 2 The Information Technology Act, 2005: A Handbook, OUP Sudhir Naib, New York, 2011
- 3 Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions", IGI Global, 2009.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the Concepts of Cyber Law
- CO2** Learn the IT Act and Cyber Regulations
- CO3** Make use of Law in professional careers
- CO4** Familiar with electronic business and legal issues
- CO5** Apply the cyber regulations.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2						2				3	2		3
CO2	1		3					2					1		
CO3	1			3			3								
CO4					1			2							
CO5				3			3			2	2		2		2

UNIT I OVERVIEW

Introduction,-difference between AR and VR-Virtual Reality-VR Headsets-VR companies-Augmented Reality- AR Companies, Mixed reality.

UNIT II AUGMENTED REALITY

9

Fields of AR-Adding sound, Multimodal display-Visual Perception- Spatial Display Model-Examples of AR.

UNIT III VIRTUAL REALITY

9

Three Is in VR - Commercial VR technology- Classic components of VR system - Input Devices- Output Devices- Modeling and Human Factors.

UNIT IV CREATION OF AR AND VR

9

Mobile AR- Tracking of AR - SDK and Games Engine- Selecting- 3D Modeling- AR Project Example.

UNIT V APPLICATIONS OF AR AND VR

9

Extended Reality in Marketing -Application of AR in Healthcare- Application of VR in Healthcare.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Anand R., “Augmented and Virtual Reality”, Khanna Publishing House, Delhi.2018

REFERENCES

- 1 Jesse Glover, Jonathan Linowes – Complete Virtual Reality and Augmented Reality Development with Unity: Leverage the power of Unity and become a pro at creating mixed reality applications. Packt publishing, 2019.
- 2 Jonathan Linowes, Krystian Babilinski – Augmented Reality for Developers: Build practical augmented reality applications with Unity, ARCore, ARKit, and Vuforia. Packt publishing, 2017.

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Compare and Contrast VR and AR concepts with Industry.
- CO2** Understand the concepts of VR with example and learn various components of it.
- CO3** Understand the concepts of content creation, interaction and iterative design of AR.
- CO4** Create various Apps using AR/VR.
- CO5** Gain knowledge in various real-time applications.

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1		2					2								
CO2	2						2								2
CO3				2				2			2				
CO4			3		3	2			2	2		3		3	
CO5			3		3	2							3		3

UNIT I INTRODUCTION

Machine Learning – perspective – Issues - Examples of Machine Learning Applications – Types of Machine Learning –Machine Learning process- preliminaries, testing Machine Learning algorithms, turning data into Probabilities, and Statistics for Machine Learning, Probability theory -Bayesian Decision Theory.

UNIT II SUPERVISED LEARNING

9

Introduction - Linear Models for Regression – Linear Regression Models and Least Squares – Subset Selection – Shrinkage Methods – Derived Input Directions - Linear Models for Classification- Discriminant Analysis – Logistic Regression – Separating Hyper planes - Neural Networks. Case Study: Handwriting Recognition.

UNIT III UNSUPERVISED LEARNING

9

Introduction - Association Rules – Apriori Algorithm - Clustering- K-means – EM Algorithm- Mixtures of Gaussians - Self-organizing Map - Principal Components, Curves and Surfaces – Independent Component Analysis. Case Study: Weather prediction.

UNIT IV REINFORCEMENT LEARNING

9

Introduction - Single State Case - Elements of Reinforcement Learning – Model Based Learning - Temporal Difference Learning – Generalization - Partially Observable States. Case Study: Healthcare Prediction

UNIT V AUTOMATION

9

Knowledge representation techniques - problem solving - search techniques - game playing - knowledge and logic - learning methods.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS**TEXT BOOKS**

- 1 Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das “Machine Learning”, First Edition, Pearson Paperback, 2018 .

REFERENCES

- 1 Pattern Recognition and Machine Learning (Information Science and Statistics) reprint of the original 1st ed. 2006 Edition by Christopher M. Bishop
- 2 Artificial Intelligence: A Modern Approach (Pearson Series in Artificial Intelligence) 4th Edition by Stuart Russell, Peter Norvig, 2008
- 3 Mitchell T, “Machine Learning”, McGraw-Hill, 1997

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory
- CO2** Recognize the characteristics of machine learning that make it useful to real-world problems.
- CO3** Characterize machine learning algorithms as supervised and unsupervised.
- CO4** Appreciate the importance of visualization in the data analytics solution
- CO5** Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1		2	1	2					1		3	3		
CO2		3		2							1				3
CO3	3	1			2		2						1	1	
CO4	2	2	3	2			1	1			3				
CO5	2	1		3		1			3					2	

19CSO403	PRINCIPLES OF ARTIFICIAL INTELLIGENCE	L	T	P	J	C
		3	0	0	0	3
UNIT I	INTRODUCTION TO INTELLIGENT AGENTS					9
Foundations-scope- problems-and approaches of AI - Reactive, deliberative, goal-driven, utility-driven, and learning agents.						
UNIT II	PROBLEM-SOLVING THROUGH SEARCH					9
Forward and backward search - state-space, blind, heuristic, problem-reduction, A, A*, AO*, minmax, constraint propagation, neural, stochastic, and evolutionary search algorithms - sample applications.						
UNIT III	KNOWLEDGE REPRESENTATION AND REASONING					9
Ontologies - foundations of knowledge representation and reasoning - representing and reasoning about objects, relations, events, actions, time, and space - predicate logic, situation calculus, description logics - reasoning with defaults - reasoning about knowledge - sample applications.						
UNIT IV	PLANNING AND REPRESENTING AND REASONING WITH UNCERTAIN KNOWLEDGE					9
Planning as search - partial order planning - construction and use of planning graphs – probability - connection to logic- independence - Bayes rule- bayesian networks - probabilistic inference - sample applications						
UNIT V	DECISION MAKING & LEARNING					9
Basics of utility theory - decision theory - sequential decision problems - elementary game theory - learning from observations (data) – problem solving - interaction and experimentation- Representative learning algorithm- learning nearest neighbor-naive Bayes and its variants-neural networks and their variants-and decision trees and their variant- Q_learning for learning action policies-sample applications.						
		L : 45	T: 0	P: 0	J: 0	Total: 45 PERIODS

TEXT BOOKS

- 1 Poole, D., Mackworth, A. “Artificial Intelligence - Foundations of Computational Agents”, New York: Cambridge University Press. 2nd Edition (2017).

REFERENCES

- 1 Ginsberg, M.,” Essentials of Artificial Intelligence”. Palo Alto, CA: Morgan Kaufmann (1993).
- 2 Luger, G. F., “Artificial Intelligence - Structures and Strategies for Complex Problem Solving”. New York, NY: Addison Wesley, 6th edition (2008).
- 3 Dean, T., Allen, J. & Aloimonos, Y., “Artificial Intelligence theory and practice”. New York: Benjamin Cummings (1995).

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Learn the basics of AI, intelligent agents.
- CO2** Understand the logical reasoning approaches to Artificial Intelligence programming.
- CO3** Recognize classical planning methods in real world.
- CO4** Apply knowledge representation techniques and problem solving strategies to AI applications.
- CO5** Implement appropriate algorithm to real world problems.

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3		2	1		3						3	3	
CO2	2	3		3					2		1		3	3	
CO3	2		3	2	2			2					2		2
CO4	3	2		1			2	3			1		3	2	
CO5			2	3	1		2				2				2

UNIT I	BASICS OF DIGITAL MARKETING	9
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Introduction – Origin and Development of Digital Marketing – Digital vs. Real Marketing -Internet Users: Penetration and Kind of Internet Use – Digital Marketing Strategy – Digital Advertising Market in India – Digital Marketing Plan – Ethical and Legal Framework of Digital Marketing.

UNIT II	DIGITAL DISPLAY ADVERTISING	9
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Introduction – Concept of Display Advertising – Digital Metrics – Types of Display Ads – Display Plan – Targeting in Digital Marketing – Geographic and Language Tagging – Programmatic Digital Advertising – Ad server – Ad Exchange – Challenges Faced by Display Advertising. Case study- Harris Teeter Case Study.

UNIT III	SEARCH ENGINE ADVERTISING	9
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Introduction –Need of pay for Search Advertising – Understanding Ad Placement – Understanding Ad Ranks – Create Your First Ad Campaign – Google Ads Account – Best Practices for Creating Effective Ads – Performance Reports – E-Commerce.

UNIT IV	SEARCH ENGINE OPTIMIZATION	9
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Introduction – Search Engine – The Concept of SEO – SEO Phases – Website Audit –On-Page Optimization – Off-Page Optimization – Social Media Reach –Google Search Engine– Local Social SEO – Google My Business – SEO for Answer Boxes. Case study- E-commerce Transactions

UNIT V	SOCIAL MEDIA MARKETING	9
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Introduction – Content Marketing - Email marketing - Mobile marketing - Pay Per Click – CRO - Web Analytics - Facebook Marketing –Twitter – LinkedIn – YouTube - Google AdWords - Google Analytics. Case studies - Adwords' Quality Score, Usage of #Hashtags.

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Seema Gupta, Digital Marketing, Second Edition, McGraw Hill Education Private Limited, 2020.

REFERENCES

- 1 Ian Dodson, The Art of Digital Marketing, Wiley, 2019
- 2 Puneet Singh Bhatia, Fundamentals of Digital Marketing, Second Edition, Pearson, 2019.
- 3 Stephanie Diamond, Digital Marketing All - In - One For Dummies, A Wiley, 2021

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the different aspects of digital marketing with its foundation
- CO2** Learn the various concepts of Digital advertising to map the customer needs
- CO3** Analyse the importance of Ad rank and best practices in Search Engine advertising
- CO4** Examine how to increase the targeted traffic of customer website using SEO
- CO5** Formulate the different social media marketing strategies with its tools

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	3	2	3				2			3		
CO2	2	3		2			2		2			2	2		
CO3	3			3			3	2		3	3	2		3	2
CO4	3	2		3		3		3						3	
CO5	3		3	3				3	2	2	3			3	

UNIT I INTRODUCTION 9

What is the IoT and why is it important?- Elements of an IoT- Technology drivers-Business drivers- Typical IoT applications- Trends and implications.

UNIT II WIRELESS TECHNOLOGIES FOR IOT 9

Sensors and sensor nodes - Sensing devices- Sensor modules, nodes and systems- Network connectivity and protocols- Wireless sensor networks -Protocols - RFID , NFC, Zigbee, GSM, GPRS

UNIT III CLOUD FOR IOT 9

The Topology of the Cloud - Cloud-to-Device Connectivity - Device Ingress/Egress - Data Normalization and Protocol Translation- Infrastructure – APIs.

UNIT IV IOT DESIGN METHODOLOGY 9

IoT systems management – IoT Design Methodology – Specifications Integration and Application Development, Arduino IDE – Programming – APIs,

UNIT V IOT APPLICATIONS 9

Home Automation -Smart Lighting -Smart Appliances - Intrusion Detection - Smoke/Gas Detectors - Smart cities. Case Studies: e.g. sensor body-area-network

L : 45 T: 0 P: 0 J: 0 Total: 45 PERIODS

TEXT BOOKS

- 1 Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015.
- 2 J. Biron and J. Follett, "Foundational Elements of an IoT Solution", O'Reilly Media, 2016.

REFERENCES

- 1 Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on Approach)”, 1st Edition, VPT, 2014.
- 2 Daniel Minoli, Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications, Wiley Publications, First Edition, 2013

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand and gain complete knowledge about internet of things
CO2 Learn the various protocols of Internet of Things (IoT)
CO3 Deploy an IoT application and connect to the cloud.
CO4 Design a portable IoT using Arduino boards
CO5 Describe and evaluate different applications of the IoT.

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	1	3		1	2			3		2		3		3
CO2		3	2	3		2				3		2		2	3
CO3	3		1	3		2						3	2		1
CO4	3	2					3	1	2			2		1	
CO5		3	2							3		3		3	1

Track 1		L	T	P	J	C
19GEP375	TECHNICAL INTERVIEWING	0	0	4	0	2
UNIT I	C - PROGRAMMING					12
Basic Programming: Data Types, Iteration, Recursion, Decision, Procedure, functions and scope. Data Structures: Arrays, Linked Lists, Trees, Graphs, Stacks, Queues, Hash Tables, Heaps. OOPs: Polymorphism, Abstraction, Encapsulation Miscellaneous, Searching and Sorting, Complexity Theory.						
UNIT II	DATA STRUCTURE CONCEPT USING C/C++/JAVA/PYTHON					12
Array and Matrices: 1D array Array Rotations Arrangement and rearrangement of elements of array Properties of matrices Inverting matrices Transpose of the matrix. Linked list: Basic operations on linked list Circular linked list. String processing and manipulation: Basic string operations Pattern searching. Stack/Queue: Basic stack operations Basic queue operations. Sorting and Searching: linear and binary search various sorting concepts.						
UNIT III	ADVANCED DESIGN AND ANALYSIS TECHNIQUES USING C/C++/JAVA/PYTHON					12
Greedy Algorithms: Activity-selection problem fractional knapsack. Minimum Spanning Trees:Kruskal, Prim. String Matching: The naive string-matching algorithm.Divide and Conquer: Sorting algorithms Binary Search. Computational Geometry: Line-segment properties Intersection of line segment.						
UNIT IV	DATABASE MANAGEMENT SYSTEMS					12
Introduction to DBMS, real time applications, advantages, disadvantages of file system, relational model, SQL, DDL, DML, TCL, DCL, keys, constraints, relational algebra, set operations, aggregate function, joins, nested query, normalization						
UNIT V	COMPUTER NETWORKS AND OPERATING SYSTEMS					12
OSI layer: Physical layer-Data link layer-Network layer-Transport layer-Session and presentation layer. Application layer-.Operating System: Types of Operating systems-Deadlock-Process synchronization-Memory management-Scheduling algorithms-paging.						
		L :0	T: 0	P: 60	J: 0	T:60 PERIODS
REFERENCES						
1 Kernighan, B.W and Ritchie,D.M, —The C Programming languagel, Second Edition, Pearson Education, 2006						
2 Mark Allen Weiss, —Data Structures and Algorithm Analysis in Cl, 2nd Edition, Pearson Education, 1997.						
3 Data structures, Algorithms, and applications in C++, SartajSahni, Universities Press, 2nd Edition, 2005.						
4 Data Abstraction and Problem Solving with Java: Walls and Mirrors by Frank M. Carrano and Janet J. Prichard						
5 AnanyLevitin, “Introduction to the Design and Analysis of Algorithms”, 3rd Edition, Pearson Education, 2012.						
6 Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System Conceptsl, Sixth Edition, Tata McGraw Hill, 2011.						
7 Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.						
8 Silberschatz, Galvin, and Gagne, “Operating System Concepts”, Ninth Edition, Wiley India Pvt Ltd, 2009.						

COURSE OUTCOMES :

At the end of the course students should be able to Apply the technical competencies to the real life problems

- CO 1** Apply the basic C programming and data structures for the real time application.
CO 2 Apply data structures using C/C++/JAVA/PYTHON for the real time application
CO 3 Apply advanced design and analysis techniques using C/C++/JAVA/PYTHON for the real time application.
CO 4 Write SQL commands and excel in Normalization techniques.
CO 5 Excel in Layers of Computer Networks and Scheduling in Operating systems

List of Exercises

S.No	Name of the Exercises
1	Domain Portal Test 1(Individual Assessment)
2	Automata Fix 1 (Individual Assessment)
3	Technical Video resume (Individual Assessment) Domain
4	Technical Interview 1 (Individual Assessment)
5	Virtual Interview (Individual Assessment)
6	Domain Portal Test 2 Individual Assessment)
7	Automata Fix 2 (Individual Assessment)
8	Technical Interview 2 (Individual Assessment) Domain
9	Empathy on Dream company (Presentation)
10	Linkedin connection Establishment -10 persons(Domain based)
11	Automata 1 (Individual Assessment)
12	Technical Interview 3 (Individual Assessment) Coding
13	Case based interviews
14	Review on Technical Certification on AOI
15	Automata 2 (Individual Assessment)
16	Technical Interview 4 (Individual Assessment) Coding
17	Hackathon/Coding Contest /Industry Specific contest
18	Mock Interview

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs) / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1															
CO2															
CO3															
CO4															
CO5															

UNIT I FRAMEWORK OF PERSONNEL PSYCHOLOGY 3+6

Nature and scope of personnel psychology-Functions of personnel psychologist-Importance of human Resource Management- Role in Providing for Equal Employment Opportunity-Objectives of personnel management.

UNIT II JOB ANALYSIS 3+6

Introduction to Job analysis-Job Descriptions- Job Specifications-Sources of Job Information-Position Analysis Questionnaire - Fleishman Job Analysis System -Importance of Job Analysis-Self-Managing Work Teams - Flexible Work Schedules - Job sharing-Selection & Interview Process-Psychometric Test.

UNIT III PERFORMANCE ANALYSIS 3+6

Methods for Measuring Performance: Making Comparisons-Rating Individuals -Rating Behaviors - Behaviorally anchored rating scale -Behavioral observation scale.

Measuring Results: Management by objectives (MBO)-Total Quality Management, Sources of Performance Information-Managers-Peers- Subordinates- Self.

UNIT IV RESUME BUILDING 3+6

Introduction - SWOT- Online learning -Preparing to Write, Writing a Winning Resume, Choosing a Resume Format, Writing a Winning Cover Letter, Professional objective and Educational section, - Canva Resume, Video Resume.

UNIT V JOB SEARCH & NETWORKING 3+6

Introduction to Job search-Job search platforms- Social Media Job Search- Introduction to job analysis- Job Evaluation- Self Screening- Importance of Networking-Types of Networking - Networking platforms.

L :15 T: 0 P: 30 J: 0 T: 45 PERIODS

REFERENCES

- 1 Dr.Nishi Goyal "Industrial Psychology" Krishna's Educational Publisher.
- 2 Dr.S.S Khanka, Human Resource Management, S.Chand Publications
- 3 Parul Singh 'Writing Effective resume for effective resume for job applications" Fortune Institute of International Business"
- 4 Andrea R Nirenberg" Essentials of Business networking" Tips, Tools and Tactics you can use, Pearson Education
- 5 Miriam Salpter "Social Networking for career success "Learning express, New York
- 6 Joshua Waldman, Job searching with social media, John Wiley & Sons, Inc

COURSE OUTCOMES :

At the end of the course students should be able to

- | | |
|------------|--|
| CO1 | To prepare yourself based on the framework of Personnel Psychology |
| CO2 | To understand the job analysis for Job search |
| CO3 | To analyze the performance in job |
| CO4 | To create the resume with required competencies |
| CO5 | To apply for the job in career portals and network through web. |

List of Exercises

S.No	Name of the Exercises
1	Mock Interview
2	Portfolio creation
3	Psychometric test
4	Video Resume
5	Cover letter and thank you letter
6	Attending business career fair
7	Empathy on Job Analysis/Search
8	Business card creation
9	Networking –Online/offline
10	Online Image & Branding
11	Exercises in career portals-Registration

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs) / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1										1		2			
CO2					3					1		2			
CO3										1		2			
CO4									2	2		2			
CO5										1		2			

UNIT I QUANTITATIVE ABILITY III**3+6**

Algebra, Power, Surds and Indices, Inverse, Logarithms, Equations, Progressions, Functions and Graphs, Perimeter, Geometry, Coordinate Geometry, Direction Sense, Logical Connectives, Venn Diagrams

UNIT II QUANTITATIVE ABILITY IV**3+6**

Puzzles, Physics, Base conversion, Trigonometry, Divisibility, Series, Simple Equations, Simplification, Quadratic Equations

UNIT III VERBAL REASONING II**3+6**

Sentence correction and completion, Para-Jumbles, Cloze Passage, Vocabulary, Voices & Forms of Speech, Multidimensional arrangement

UNIT IV NON- VERBAL REASONING**3+6**

The Embedded figure, Logical Games, Incomplete Pattern, Missing letters, Data arrangement, Mathematical orders, Inferred meaning

UNIT V LINGUISTICS SKILLS III**3+6**

Sentence improvement, Subject-Verb agreement, Speech & voices, Preposition & Conjunctions, Selection words, Comprehension ordering

L :15 T: 0 P: 30 J: 0 T:45 PERIODS**TEXT BOOKS**

- 1 Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.

REFERENCES

- 1 R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
- 2 M.K.Panday, "Analytical Reasoning", Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 S.P.Bakshi, "Objective English" Arihant Publications.(Unit V)
- 5 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited.
- 6 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Apply the algebra & geometrical for quantitative ability.
- CO2** Apply the puzzle and trigonometry for quantitative ability.
- CO3** Analyze the verbal reasoning and the critical reasoning in quantitative aptitude
- CO4** Analyze the non-verbal reasoning skills
- CO5** Apply appropriate linguistic skills in LSWR

List of Exercises

S.No	Exercises
1	Assessment 1 from Quantitative Ability III
2	Assessment 2 from Quantitative Ability III
3	Assessment 3 from Quantitative Ability III
4	Assessment 1 from Quantitative Ability IV
5	Assessment 2 from Quantitative Ability IV
6	Assessment 3 from Quantitative Ability IV
7	Assessment 1 from Verbal Reasoning II
8	Assessment 2 from Verbal Reasoning II
9	Assessment 3 from Verbal Reasoning II
10	Assessment 1 from Non Verbal Reasoning II
11	Assessment 2 from Non Verbal Reasoning II
12	Assessment 3 from Non Verbal Reasoning II
13	Assessment 1 from Linguistics Skills III
14	Assessment 2 from Linguistics Skills III
15	Assessment 3 from Linguistics Skills III

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3			3					2						
CO2	3			3					2						
CO3				3					2	3					
CO4				3					2	3					
CO5				3					2	3					

Track 2

19GEB376	ENTREPRENEURSHIP & BUSINESS MODEL CANVAS	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	2	0	4	0	4
UNIT I	INTRODUCTION					6+8
Meaning and concept of entrepreneurship, role of entrepreneurship in economic development, agencies in entrepreneurship management and future of entrepreneurship, types of entrepreneurs, skills/ traits required to be an entrepreneur, Creative and Design Thinking, the entrepreneurial decision process, skill gap analysis, and role models, mentors and support system, entrepreneurial success stories.-Business Storytelling						
UNIT II	BUSINESS MODEL CANVAS					6+36
Idea generation by design thinking, Idea Validation, Business Model Canvas- Value Proposition, Customer Segments, Channels and Partners, Revenue Model and Streams, Key Resources, Activities, and Costs Customer Relationships and Customer.						
UNIT III	BUSINESS MODEL TO BUSINESS PLAN					6+4
Translate Business Model into a Business Plan, Visioning for venture, Take product or service to market, Deliver an investor pitch to a panel of investors, Identify possible sources of funding for your venture – customers, friends and family, Angels, VCs, Bank Loans and key elements of raising money for a new venture.						
UNIT IV	BUSINESS LICENSES AND PERMITS					6+4
Business Licenses and permits Business Licenses, business permits, choosing a form of business organization, sole proprietorship, partnership, corporations, Limited Liability Company.						
UNIT V	TOOLS FOR ENTREPRENEURS					6+8
Agile Entrepreneurship, Business Process Management & Automation, Taking Business to Digital World via Digital Marketing & eCommerce, HRM and Keeping it lean with Freelancers						
		L :30	T: 0	P: 60	J: 0	T: 90 PERIODS

REFERENCES

- 1 Donald F Kuratko, “Entrepreneurship – Theory, Process and Practice”, 9th Edition, Cengage Learning, 2014.
- 2 Khanka. S.S., “Entrepreneurial Development” S.Chand & Co. Ltd., Ram Nagar, New Delhi, 2013.
- 3 Osterwalder, A. and Y. Pigneur. 2010. Business Model Generation. John Wiley & Sons. Hoboken, NJ
- 4 Levin, Jack S. Structuring Venture Capital, Private Equity, and Entrepreneurial Transactions. Aspen Publishers, 2009
- 5 Sole proprietorship, partnership, corporations, Limited Liability Company - Kapoor.N.D, ‘Elements of Mercantile Law’, 30th Edition, Sultan Chand &Co., 2015
- 6 The art of digital marketing, definitive guide by Ian Dodson, Wiley.
- 7 Marlon Dumas “Fundamentals of business process management” second edition, springer.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Understand the need for entrepreneurship and its characteristics
- CO2** Apply the ideas in to business model canvas
- CO3** Know the funding partner & investor for entrepreneurship
- CO4** Apply for business licenses and permits for their company/startup
- CO5** Apply the various tools for entrepreneurship/startup

List of Exercises

S.No	Exercises
1	Business Model Analysis 1
2	Business Model Analysis 2
3	Idea Generation & Validation
4	BMC Value Proposition Pitch
5	BMC- Customer Segments Pitch
6	BMC- Channels Pitch
7	BMC- Revenue Model and Streams Pitch
8	BMC- Key Resources & Key Activities Pitch
9	BMC- Key Partners & Cost Structure Pitch
10	BMC- Customer Relationships Pitch
11	Final BMC Pitch
12	Report on Investors/Funding agency
13	Report on Business License & Permits
14	Digital Marketing Exercises
15	Case study on Business Process Automation

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1										2		2			
CO2				3					2	2		2			
CO3				3					2	2		2			
CO4				3					2	2		2			
CO5				3	3				2	2		2			

UNIT I Managerial Economics

Introduction to Engineering Economics – Scope of Engineering Economics - Break Even Analysis - Elementary economic analysis- Demand and Supply

UNIT II Financial Accounting

Introduction to Financial Accounting-Book Keeping-Journal-Ledger- Trial Balance- Trading Account- Profit and Loss Account- Balance sheet statement - Working capital management

UNIT III Cost Accounting

Introduction to Cost Accounting- Elements of cost- Types of cost -Cost Accounting systems: Job costing- Process costing

UNIT IV Budget

Introduction to budgeting- Characteristics of a sound budget-Fixed budget-Production. Budget- Sales budget-Flexible budgets- Zero base budgeting and budgetary control-ROI

UNIT V Purchase Management

Role of Purchase department-Vendor selection- Purchase- Documents related to Purchase: Invoice Generation-Material Inward & Outward-Introduction to ERP & SAP

L :15 T: 0 P: 0 J: 0 T:15 PERIODS

REFERENCES

- 1 R. Kesavan, C.Elanchezhian and T.Sundar Selwyn, "Engineering Economics and Financial Accounting", Laxmi Publications 2011
- 2 Maheswaran. S.N., "Management Accounting and Financial Control", Sultan Chand, 2011
- 3 James. C., Vanhorn, "Fundamentals of Financial Management" PHI, 2012
- 4 Bhattacharya, S.K. and John Deardon, "Accounting for management – Text and Cases", Vikas Publishing house, New Delhi, 1996
- 5 Dr.B.K.Mehta "Management Accounting "SBPD Publications.
- 6 Anil Kumar S, Suresh Kumar N- "Operations management" New Age International 2009

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Understand about Managerial economics for Entrepreneurship
CO2 Learn about Financial accounting for Entrepreneurship
CO3 Know about Cost accounting for Entrepreneurship
CO4 Understand Budget for Entrepreneurship
CO5 Apply the Purchase Management for Entrepreneurship

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1		3								1		2			
CO2	3	3		3					1	1		2			
CO3	3	3		3					1	1		2			
CO4	1	3		3					1	1		2			
CO5		3							1	1		2			

UNIT I INTRODUCTION**3**

Introduction and the need for intellectual property right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication - Trade Secret.

UNIT II PATENTS**3**

Patents - Elements of Patentability: Novelty , Non Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence , Restoration of lapsed Patents, Surrender and Revocation of Patents.

UNIT III COPYRIGHT**3**

Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership of copyright, Assignment and licence of copyright.

UNIT IV TRADEMARK**3**

Concept of Trademarks - Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) - Non Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks

UNIT V OTHER FORMS OF IP**3**

Design: meaning and concept of novel and original - Procedure for registration, effect of registration and term of protection

Geographical Indication (GI): meaning, and difference between GI and trademarks - Procedure for registration, effect of registration and term of protection

L :15 T: 0 P: 0 J: 0 T:15 PERIODS

Mandatory Assignment – Students must file IPR in any of the above area

TEXT BOOKS

- 1 Nithyananda, K V. (2019). Intellectual Property Rights: Protection and Management. India, IN: Cengage Learning India Private Limited.
- 2 Neeraj, P., & Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI learning Private Limited.

REFERENCES

- 1 Deborah E. Bouchoux, Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets, Cengage Learning, Third Edition, 2012.
- 2 Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.
- 3 Prabuddha Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy, McGraw Hill Education, 2011
- 4 Ahuja, V K. (2017). Law relating to Intellectual Property Rights. India, IN: LexisNexis.

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Know about Intellectual property rights and classification.
- CO2** Understand about Patents, Registration & Procedure and other information
- CO3** Learn about Copyrights, Registration & Procedure and other information
- CO4** Understand about Trademark, Registration & Procedure and other information
- CO5** Know about other forms of IP, Registration & Procedure and other information

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1				3				2	1	1		2			
CO2				3				2	1	1		2			
CO3				3				2	1	1		2			
CO4				3				2	1	1		2			
CO5				3				2	1	1		2			

Track 3

19GEB377

ADVANCED VERBAL QUANTITATIVE APTITUDE

REASONING

L	T	P	J	
2	0	2	0	3

(Common to All B.E. / B. Tech. Courses)

UNIT I QUANTITATIVE ABILITY III

6+6

Algebra, Power, Surds and Indices, Inverse, Logarithms, Equations, Progressions, Functions and Graphs, Perimeter, Geometry, Coordinate Geometry, Direction Sense, Logical Connectives, Venn Diagrams

UNIT II QUANTITATIVE ABILITY IV

6+6

Puzzles, Physics, Base conversion, Trigonometry, Divisibility, Series, Simple Equations, Simplification, Quadratic Equations

UNIT III VERBAL REASONING II

6+6

Sentence correction and completion, Para-Jumbles, Cloze Passage, Vocabulary, Voices & Forms of Speech, Multi dimensional arrangement

UNIT IV NON- VERBAL REASONING

6+6

The Embedded figure, Logical Games, Incomplete Pattern, Missing letters, Data arrangement, Mathematical orders, Inferred meaning

UNIT V LINGUISTICS SKILLS III

6+6

Agile Entrepreneurship, Business Process Management & Automation, Taking Business to Digital World via Digital Marketing & e Commerce, HRM and Keeping it lean with Freelancers

L :30 T: 0 P: 30 J: 0 T: 60 PERIODS

TEXT BOOKS

- 1 Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.

REFERENCES

- 1 R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
- 2 M.K.Panday, "Analytical Reasoning", Magical Series.
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 S.P.Bakshi, "Objective English" Arihant Publications.
- 5 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited
- 6 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.

COURSE OUTCOMES :

At the end of the course students should be able to

CO1 Apply the geometry, algebra and directions ability for solving application oriented concepts in quantitative aptitude

CO2 Apply the trigonometry and equations ability for solving application oriented concepts in quantitative aptitude

CO3 Analyze the verbal reasoning and the critical reasoning in quantitative aptitude

CO4 Analyze the non-verbal reasoning in verbal aptitude applications

CO5 Apply appropriate LSRW skills

List of Exercises

S.No	Exercises
1	Assessment 1 from Quantitative Ability III
2	Assessment 2 from Quantitative Ability III
3	Assessment 3 from Quantitative Ability III
4	Assessment 1 from Quantitative Ability IV
5	Assessment 2 from Quantitative Ability IV
6	Assessment 3 from Quantitative Ability IV
7	Assessment 1 from Verbal Reasoning II
8	Assessment 2 from Verbal Reasoning II
9	Assessment 3 from Verbal Reasoning II
10	Assessment 1 from Non Verbal Reasoning II
11	Assessment 2 from Non Verbal Reasoning II
12	Assessment 3 from Non Verbal Reasoning II
13	Assessment 1 from Linguistics Skills III
14	Assessment 2 from Linguistics Skills III
15	Assessment 3 from Linguistics Skills III

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3			3					2						
CO2	3			3					2						
CO3				3					2	3					
CO4				3					2	3					
CO5				3					2	3					

UNIT I INTRODUCTION**3**

Networking, Benefits, Quality vs Quantity in Networking, Networking for new opportunities, Networking for Professional Partnership, Local and In-person networking

UNIT II DIGITAL NETWORKING**3**

Tools for Online Networking – LinkedIn, Facebook, Twitter, Google+, LMS, Open Learning Networks

UNIT III EMPATHIZING**3**

Art of Listening, Empathy, Listening Models, Networking etiquette, Digital Storytelling, Lead Generation

UNIT IV COMMUNICATION**3**

Interpersonal Skills, Personality and Emotional Intelligence, Business Communication, Copyrights, Networking Plan

UNIT V DIGITAL FOOTPRINTS**3**

Introverts & Extroverts, Maintain Your Connections, Long-Term Networking Strategies, Case Studies-Scholarship for higher education in various countries –Case study

L :15 T: 0 P: 0 J: 0 T: 15 PERIODS

Mandatory Assignments

1. LinkedIn, FB, Twitter, Google+ account creation- Networking with 10 Professors from different Countries
2. Attending Professional events on Overseas education
3. Case study on Success Networking for overseas education
4. Case Study on Overseas Scholarship

REFERENCES

- 1 Andrea R Nirenberg "Essentials of Business networking" Tips, Tools and Tactics you can use, Pearson Education
- 2 Miriam Salpter "Social Networking for career success "Learning express, Newyork
- 3 Andrea R Nirenberg "Network like you means it" handbook for business and personal networking.
- 4 S.P.Bakshi, "Objective English" Arihant Publications.
- 5 Peter W Cardon "Business Communication" Tata Mcgraw Hill Publications, Third edition
- 6 Elizabeth A Segal "Social Empathy-Art of understanding others" Columbia University press, New York

WEB REFERENCES

1. <https://www.udemy.com/course/networking101/>
2. <https://learndigital.withgoogle.com/digitalunlocked/course/effective-networking>
3. <https://www.linkedin.com/learning/professional-networking>
4. <https://alison.com/course/personal-business-networking-skills-for-maximum-success>
5. <https://www.edx.org/professional-certificate/uwashingtonx-english-for-business-networking>

COURSE OUTCOMES:

At the end of the course students should be able to

- CO1** Understand the networking and its significance
- CO2** Apply the digital tools for networking with overseas professors.
- CO3** Empathize the need and prepare themselves for overseas education
- CO4** Apply the communication skills for the overseas education
- CO5** Apply the networking strategies for scholarship in overseas education

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1									1	2		2			
CO2					3				1	2		2			
CO3									1	2		2			
CO4									1	2		2			
CO5									1	2		2			

UNIT I OVERVIEW OF HIGHER STUDIES**3+6**

Higher Education in abroad: Introduction- Admission process- Identification & Procedure - SOP-LOR- Desirable Characteristics - Introduction to Proficiency test- Higher education in India & Examinations

UNIT II SELECTION & SCHOLARSHIP**3+6**

Top Universities in world- Cost of overseas education- Funding & Scholarships- Case studies

Higher Education in USA, UK, France, Singapore, Germany, Norway, Sweden, Australia & Netherland

UNIT III GRE & GMAT**3+6**

GRE & GMAT: Importance of GRE & GMAT- Syllabus- Assessment pattern- Analytical reasoning- Quants- Verbal- Integrated Reasoning- Analytical writing assessment

UNIT IV TOEFL & IELTS**3+6**

Importance of TOEFL & IELTS - Syllabus- Assessment Pattern- Reading- Speaking - Writing

UNIT V GATE**3+6**

Importance of GATE- Syllabus - Assessment Pattern- Weightages in the different domain- General Aptitude- Candidate selected subject

L :15 T: 0 P: 30 J: 0 T:45 PERIODS**REFERENCES**

- 1 B.S. Warriar "Studying Abroad" Tata McGraw Hill Education Private Limited, New Delhi
- 2 Dr.T.P.Sethumadhavan "Study abroad" iRank publishers, India
- 3 General Aptitude & Engineering Mathematics 2022, Pearson Education

COURSE OUTCOMES:

At the end of the course students should be able to

- CO1** To categorize the higher education in abroad and India
- CO2** Analyze the selection and scholarship in various countries
- CO3** Analyze GRE & GMAT Selection process and Assessment
- CO4** Analyze TOEFL & IELTS Selection process and Assessment
- CO5** Analyze GATE Selection process and Assessment

List of Exercises

- | S.No | Name of the Exercises |
|------|--|
| 1 | Case study on Higher Education in the specific country |
| 2 | Assessment 1 for GRE/GMAT |
| 3 | Assessment 2 for GRE/GMAT |
| 4 | Assessment 3 for GRE/GMAT |
| 5 | Assessment 4 for GRE/GMAT |
| 6 | Assessment 1 for TOEFL & IELTS |
| 7 | Assessment 2 for TOEFL & IELTS |
| 8 | Assessment 3 for TOEFL & IELTS |
| 9 | Assessment 4 for TOEFL & IELTS |
| 10 | Assessment 1 for GATE |
| 11 | Assessment 2 for GATE |

12 Assessment 3 for GATE

13 Assessment 4 for GATE

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1									1	1		2			
CO2									1	1		2			
CO3	3								1	1		2			
CO4	3								1	1		2			
CO5	3								1	1		2			

Track 4

19GEB378	FOUNDATION COURSE ON COMPETITIVE EXAMS	L	T	P	J	C
	(Common to All B.E. / B. Tech. Courses)	2	0	4	0	4

UNIT I QUANTITATIVE ABILITY III 6+12

Algebra, Power, Surds and Indices, Inverse, Logarithms, Equations, Progressions, Functions and Graphs, Perimeter, Geometry, Coordinate Geometry, Direction Sense, Logical Connectives, Venn Diagrams, Puzzles, Physics, Base conversion, Trigonometry, Divisibility, Series, Simple Equations, Simplification, Quadratic Equations

UNIT II VERBAL REASONING II 6+12

Sentence correction and completion, Para-Jumbles, Cloze Passage, Vocabulary, Voices & Forms of Speech, Multi dimensional arrangement

UNIT III NON- VERBAL REASONING II 6+12

The Embedded figure, Logical Games, Incomplete Pattern, Missing letters, Data arrangement, Mathematical orders, Inferred meaning

UNIT IV GENERAL AWARENESS FOR CIVIL SERVICE EXAMS 6+12

Current events of National & International importance, History of India & Indian National Movement, Indian & World Geography – Physical, Social, Economic Geography of India & the World, Indian Polity & Governance – Constitution, Political System, Panchayati Raj, Public Policy, Rights Issues, Economic & Social Development – Sustainable Development, Poverty, Inclusion, Demographics, Social Sector Initiatives, Environmental ecology, Bio-diversity & climate change, General Science.

UNIT V GENERAL AWARENESS FOR BANKING SECTORS 6+12

Current Affairs (National and International), Major Financial/Economic News, Budget and Five Year Plans, Who's Who, Sports, Books and Authors, Awards and Honors, Science – Inventions and Discoveries, Abbreviations, Important Days, International and National Organizations

L :30 T: 0 P: 60 J: 0 T: 90 PERIODS

REFERENCES

- 1 Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.
- 2 R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited
- 3 BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.
- 4 R.S.Agarwal, "A modern approach to Verbal & Non-verbal reasoning", S.Chand & Company Pvt Limited.
- 5 NIOS course books for classes XI and XII on - Ancient India, Medieval India, Modern India, National Movement & Contemporary World and Culture of India.
- 6 The Story of Civilization, Part 2 by Arjun Dev, NCERT
Certificate Physical & Human Geography (Oxford) by Goh Cheng Leong
General Knowledge 2019 (English, Paperback, Pandey Manohar)

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Apply the quantitative ability for competitive exams.
- CO2** Know the verbal reasoning for competitive exams
- CO3** Understand the non-verbal reasoning for competitive exams.
- CO4** Apply the general awareness in the civil service exams
- CO5** Understand the general awareness in the banking exams

List of Exercises

S.No	Name of the Exercises
1	Assessment 1 from Quantitative Ability III
2	Assessment 2 from Quantitative Ability III
3	Assessment 3 from Quantitative Ability III
4	Assessment 1 from Verbal Reasoning II
5	Assessment 2 from Verbal Reasoning II
6	Assessment 3 from Verbal Reasoning II
7	Assessment 1 from Non Verbal Reasoning II
8	Assessment 2 from Non Verbal Reasoning II
9	Assessment 3 from Non Verbal Reasoning II
10	Assessment 1 from General Awareness for Civil Service
11	Assessment 2 from General Awareness for Civil Service
12	Assessment 3 from General Awareness for Civil Service
13	Assessment 1 from General Awareness for Banking
14	Assessment 2 from General Awareness for Banking
15	Assessment 3 from General Awareness for Banking

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3			2					1	2		2			
CO2				2					1	2		2			
CO3				2					1	2		2			
CO4									1			2			
CO5									1			2			

GOVERNMENT JOBS

(Common to All B.E. / B. Tech. Courses)

1 0 2 0 2

UNIT I GOVERNMENT JOBS

3+6

Hierarchical structure of Indian Government- Preamble to Constitution of India-7th pays commission- Classification of Government Services-Classification of Groups-Pay Band, Pay & Emoluments- Educational Qualifications.

UNIT II CIVIL SERVICES

3+6

Post & Selection Process: general group A services- technical group A services- uniformed group A services-group B services-group C services.

UNIT III RRB & PUBLIC SECTOR BANK

3+6

Railway Recruitment Board: Introduction to RRB-classification of RRB- Post & Selection Process

Public Sector Bank: Introduction to public sector banks- Post & Selection Process: RBI-SBI-IBPS- other public sector banks

UNIT IV CENTRAL/STATE PUBLIC SECTOR COMPANIES

3+6

Public sector classification- Post & selection process:: maharatna - navratna - miniratna- Non GATE- public sector insurance companies- central universities- other government jobs

UNIT V RESUME BUILDING & NETWORKING

3+6

Introduction- SWOT- Online learning -Writing a Winning Resume, Choosing a Resume Format - Canva Resume- Video Resume.- Importance of networking -Networking platforms

L :15 T: 0 P: 30 J: 0 T: 45 PERIODS**REFERENCES**

- 1 KP. Shashidharan “ Know How to get government Jobs” Jaico Publishing home
- 2 Dipak Anand IAS “How to Succeed in Civil Services” Ocean books private limited
- 3 VVK Subburaj “Railway Recruitment Board Exams, Technical Cadre” Sura Books Private Limited
- 4 Banking Awareness by Disha Publication, 4th Edition
- 5 Rajesh Varma, “Fast Track Objective Arithmetic”, Arihant Publications.
- 6 Parul Singh 'Writing Effective resume for effective resume for job applications."Fortune Institute of International Business"
- 7 Andrea R Nirenberg "Essentials of Business networking" Tips, Tools and Tactics you can use, Pearson Education
- 8 Miriam Salpter “Social Networking for career success “Learning express, Newyork

COURSE OUTCOMES :

At the end of the course students should be able to

- CO1** Categorize Indian constitution and Government services
- CO2** Analyze the civil services post and selection process
- CO3** Analyze the RRB & Public sector banks post and selection process
- CO4** Analyze the central and state public sector companies post and selection process
- CO5** Develop the resume building and networking

List of Exercises

S.No	Name of the Exercises
1	Assessment for Group A Services
2	Assessment for Group B Services
3	Assessment for Group C Services
4	Assessment for Uniformed Services
5	Assessment 1 for RRB
6	Assessment 2 for RRB
7	Assessment 1 for Banking Exams
8	Assessment 2 for Banking Exams
7	Assessment for Public sector company 1
8	Assessment for Public sector company 2
9	Resume Preparation for Government Jobs
10	Video Resume for Government Jobs
11	Networking Exercises using Linked In

CO/PO Mapping															
(S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs)/ / Programme Specific Outcomes(PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1												2			
CO2	2			3					1	1		2			
CO3	2			3					1	1		2			
CO4	2			3					1	1		2			
CO5									1	2		2			

COURSE CONTENT

Overview of Arduino-Board Types-Board Descriptions-Arduino Installations-Program Structure-Arduino Data types-Arduino Sketch Structure - Variables and Constants-Operators-Control Statements-Loops-Functions-Strings-String Object-Time –Array - I/O Functions-Advanced I/O Functions-Character Functions-Math Library-Trigonometric Functions - Due zero-Pulse Width Modulations-Random Numbers-Interrupt—Communications-Inter Integrated Circuits-Serial Peripheral Interface - Home Automation Using Arduino-Creating Body Sensor Network using Arduino-Solar Street Light System-Arduino Based Car Parking Systems.

Total: 15 PERIODS**REFERENCES**

- 1 Simon Monk, “Programming Arduino: Getting Started with Sketches”, McGraw-Hill Education, Second Edition, 2016
- 2 Massimo Banzi, “Getting Started with Arduino: The Open Source”, Shroff Publishers & Distributors Pvt Ltd, 2014

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the basic Knowledge of arduino boards and its's components
CO2 Familiarize students with Arduino as IDE, Programming Languages and platform
CO3 Develop skills to design and implement various smart system applications
CO4 Design and validate the interfacing of different sensors with arduino
CO5 Deploy to complete customizable full Arduino project autonomously, from the beginning to the end;

CO/PO Mapping															
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1												3	1	
CO2					3								2	1	
CO3			3		2										3
CO4			3	3											
CO5											1	2			3

MODULE I INTRODUCTION TO FLUTTER FRAMEWORK

Introduction- Why Flutter?- Why Dart?-set up your Environment-Build a Flutter App-Flutter's Reactive Framework - Dart Package Definition and Imports-Dart Program Entry Point Dart Data Variables and Types- Data Conversions – Operators- Conditionals and Loops- Classes and Functions - Asynchrony Support- Documentation

MODULE II FLUTTER USER INTERFACES

Flutter Widget types-Catalog-Flutter Layouts-Themes and Styles-Flutter Custom Images,Icon and Fonts - Flutter Navigation and Routing,-Webview-Widget Lifestyle-Flutter interactive Layouts-User Inputs and Gesture - Material Design-platform and Themes-Colors-Colorswatches-Text input-Gestures-Error Handling Material Design-platform and Themes-Colors-Colorswatches-Text input-Gestures-Error Handling

Total: 15 PERIODS**REFERENCES**

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012
2. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Understand the Basic requirements of mobile application
- CO2** Apply Dart fundamentals in Flutter mobile and console app.
- CO3** Create a new Flutter app project using IntelliJ IDEA, Android Studio and Dartpad.
- CO4** Create widgets like user interfaces, touches and inputs to allow app users to interact with the Flutter app
- CO5** Deploy a Working mobile app

CO/PO Mapping															
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CO1													3		
CO2		1			3	1									
CO3			3		3									3	
CO4			3		3									3	
CO5				2							2				3

MODULE I INTRODUCTION

Raspberry Pi Board-Raspberry Pi Processor-Raspberry Pi Vs Arduino-Operating System Benefits-Processes-Raspberry Setup-Configuration - Linux Basics-Login-Linux File System-Navigating the File System-Text Editor-Accessing Files-Linux Graphics User Interface

MODULE II PYTHON PROGRAMMING WITH RASPBERRY PI

Python on Raspberry Pi-Python Programming Environment-Python Expression-Strings-Functions-Function Argument-List-List Methods-Control Flow

MODULE III RASPBERRY PI THROUGH GRAPHICAL USER INTERFACE

General Purpose-protocols pins-GPIO Access-General Purpose IO pins-Pulse Width Modulation-Tkinter Library – Real Time Applications.

Total: 15 PERIODS

REFERENCES

- 1 Simon Monk, “Programming the Raspberry Pi: Getting Started with Python”, January 2012, McGraw Hill Professional
- 2 Eben Upton and Gareth Halfacree, “Raspberry Pi User Guide”, August 2016, 4th edition, John Wiley & Sons

COURSE OUTCOMES

At the end of the course student should be able to:

- CO1** Familiar with basic foundations of Python Programming and libraries
CO2 Apply Wire Raspberry Pi with python programming
CO3 Create a fully functional computer with Wire Raspberry Pi
CO4 Use Python based IDE and trace and debug python code on the device
CO5 Implement various communication protocols for wired and wireless communications.

CO/PO Mapping (S/M/W indicates strength of correlation)3-Strong, 2-Medium, 1-Weak															
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CO1	2												3		
CO2		1							1						
CO3			3		1						1				
CO4				1		2								2	
CO5			2						1			1			3