

K.L.N. COLLEGE OF ENGINEERING

Pottapalayam-630612, Sivagangai District

(An Autonomous Institution, Affiliated to Anna University, Chennai)



Estd: 1994

CURRICULUM AND SYLLABUS

I to VIII Semesters

REGULATIONS 2020

For under Graduate Program

B.E. COMPUTER SCIENCE AND ENGINEERING

CHOICE BASED CREDIT SYSTEM

(For the students admitted in the academic year 2020-2021)



K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM
(An Autonomous Institution, Affiliated to Anna University, Chennai)



VISION OF THE INSTITUTION

To become a Centre of Excellence in Technical Education and Research in producing Competent and Ethical professionals to the society

MISSION OF THE INSTITUTION

To impart Value and Need based curriculum to the students with enriched skill development in the field of Engineering, Technology, Management and Entrepreneurship and to nurture their character with social concern and to pursue their career in the areas of Research and Industry.

VISION OF THE DEPARTMENT

To evolve in the field of Computer Science & Engineering through sustainable technical education with innovative research and to foster competent professionals to serve and lead the society

MISSION OF THE DEPARTMENT

- Imparting demand based proficient education through quality teaching – learning process in tune with the interdisciplinary needs of global work environment.
- Inculcating the attitude of continuous learning through industry institution interaction, consultancy and research activities.
- Cultivating professionalism, ethics and integrity of character for positive contributions to society.



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PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: Contribute effectively to the society by applying principles of Computer Science and Engineering for analyzing the real world problems to produce optimal and sustainable technical solutions.

PEO 2: Sustain as good professionals by pursuing career / advanced studies and practice innovation in emerging technologies and current trends through lifelong learning.

PEO 3 : Build professionalism, team work, effective communication, ethical values and leadership qualities.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Ability to apply good analytical, design and implementation skills to formulate and solve scientific and business applications pertaining to Algorithms, Computer Systems, Networks, Security, Data Analytics and Artificial Intelligence.

PSO2: Ability to update knowledge continuously in various domains like Virtualization, Mobile Application Development, Data Visualization, Machine Learning and Technologies like Storage, Computing, Communication to meet the industry requirements



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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.



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REGULATIONS 2020

For Under Graduate Program

B.E. – COMPUTER SCIENCE AND ENGINEERING

CHOICE BASED CREDIT SYSTEM

CATEGORY OF COURSES

- i. **Humanities and Social Sciences (HS) Courses** include Technical English, Environmental Science and Engineering, Engineering Ethics and human values, Communication Skills and Management courses.
- ii. **Basic Sciences (BS) Courses** include Mathematics, Physics, and Chemistry.
- iii. **Engineering Sciences (ES) Courses** include Engineering Practices, Engineering Graphics, Basics of Electrical / Electronics / Mechanical / Computer Engineering / Instrumentation etc.
- iv. **Professional Core (PC) Courses** include the core courses relevant to the chosen programme of study.
- v. **Professional Elective (PE) Courses** include the elective courses relevant to the chosen programme of study.
- vi. **Open Elective (OE) Courses** include courses from other departments which a student can choose from the list specified in the curriculum of the students B.E. / B.Tech. Programmes.
- vii. **Employability Enhancement Courses (EEC)** include Project Work and/or Internship, Seminar, Professional Practices, Case Study and Industrial/Practical Training.
- viii. **Mandatory (MC) Courses** include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc



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REGULATIONS 2020
CHOICE BASED CREDIT SYSTEM
B.E. COMPUTER SCIENCE AND ENGINEERING
I TO VIII SEMESTERS
CURRICULUM AND SYLLABUS

SEMESTER I

(Common to all B.E. / B.Tech Programmes)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	20HS101	English for Technical Communication	HS	3	3	0	0	3
2.	20BS101	Fundamentals of Engineering Mathematics	BS	4	3	1	0	4
3.	20BS102	Engineering Physics	BS	3	3	0	0	3
4.	20BS103	Engineering Chemistry	BS	3	3	0	0	3
5.	20GE101	Problem Solving using Python Programming	ES	3	3	0	0	3
PRACTICAL								
6.	20BS1L1	Basic Science Laboratory	BS	3	0	0	3	1.5
7.	20GE1L1	Python Programming Laboratory	ES	4	0	0	4	2
8.	20GE1L2	Industrial Practices Workshop	ES	3	0	0	3	1.5
TOTAL				26	15	1	10	21

SEMESTER II

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	20HS201	Advanced Technical Communication (Common to all B.E. / B.Tech programmes)	HS	3	3	0	0	3
2.	20BS201	Laplace Transform and Advanced Calculus (Common to all B.E. / B.Tech programmes)	BS	4	3	1	0	4
3.	20BS204	Physics for Information Science (Common to B.E. CSE & B.Tech IT programmes)	BS	3	3	0	0	3
4.	20GE201	Engineering Graphics (Common to all B.E. / B.Tech programmes)	ES	4	2	0	2	3
5.	20GE205	Basic Electrical and Electronics Engineering (Common to B.E. CSE & B.Tech IT programmes)	ES	3	3	0	0	3
6.	20CS201	Programming in C (Common to B.E. EEE, B.E. CSE, B.Tech IT & B.E. EIE programmes)	PC	3	3	0	0	3
PRACTICAL								
7.	20HS2L1	Communication Skills Laboratory (Common to B.E. MECH, B.E. CSE, B.Tech IT & B.E. AuE programmes)	HS	2	0	0	2	1
8.	20CS2L1	C Programming Laboratory (Common to B.E. EEE, B.E. CSE, B.Tech IT & B.E. EIE programmes)	PC	4	0	0	4	2
TOTAL				26	17	1	8	22

SEMESTER III

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	20BS303	Discrete Mathematics (Common to B.E. CSE & B.Tech IT programmes)	BS	4	3	1	0	4
2.	20CS301	Digital Principles and System Design (Common to B.E. CSE & B.Tech IT programmes)	ES	4	3	1	0	4
3.	20CS302	Data Structures and Algorithms (Common to B.E. CSE & B.Tech IT programmes)	PC	3	3	0	0	3
4.	20EC304	Analog and Digital Communication (Common to B.E. CSE & B.Tech IT programmes)	ES	3	3	0	0	3
5.	20HS301	Universal Human Values (Common to all B.E. / B.Tech programmes)	HS	3	2	1	0	3
PRACTICAL								
6.	20CS3L1	Digital Systems Laboratory (Common to B.E. CSE & B.Tech IT programmes)	ES	4	0	0	4	2
7.	20CS3L2	Data Structures and Algorithms Laboratory (Common to B.E. CSE & B.Tech IT programmes)	PC	4	0	0	4	2
8.	20CS3L3	Object Oriented Programming Laboratory (Common to B.E. CSE & B.Tech IT Programmes)	PC	4	0	0	4	2
TOTAL				29	14	3	12	23

SEMESTER IV

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	20BS403	Probability, Statistics and Queuing Theory	BS	4	3	1	0	4
2.	20CS401	Computer Organization and Architecture (Common to B.E. CSE & B.Tech IT programmes)	PC	3	3	0	0	3
3.	20CS402	Database Management Systems (Common to B.E. CSE & B.Tech IT programmes)	PC	3	3	0	0	3
4.	20CS403	Design and Analysis of Parallel Algorithms	PC	3	3	0	0	3
5.	20HS401	Environmental Science and Engineering (Common to all B.E. / B.Tech programmes)	HS	2	2	0	0	2
THEORY CUM PRACTICAL								
6.	20CS404	Operating Systems (Common to B.E. CSE & B.Tech IT programmes)	PC	5	3	0	2	4
PRACTICAL								
7.	20CS4L1	Database Management Systems Laboratory (Common to B.E. CSE & B.Tech IT programmes)	PC	4	0	0	4	2
8.	20HS4L2	Professional Communication Laboratory (Common to B.E. EEE, B.E. CSE, B.Tech IT, B.E AuE & B.E. EIE programmes)	EEC	2	0	0	2	1
TOTAL				26	17	1	8	22

SEMESTER V

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	20CS501	Computer Networks (Common to B.E. CSE & B.Tech IT programmes)	PC	3	3	0	0	3
2.	20CS502	Software Engineering (Common to B.E. CSE & B.Tech IT programmes)	PC	3	3	0	0	3
3.	20CS503	Theory of Computation	PC	4	3	1	0	4
4.	20EC506	Microcontrollers and Embedded Systems (Common to B.E. CSE & B.Tech IT programmes)	PC	3	3	0	0	3
5.		Open Elective I	OE	3	3	0	0	3
6.	20MC501	Constitution of India (Common to all B.E. / B.Tech programmes)	MC	1	1	0	0	-
PRACTICAL								
7.	20CS5L1	Networks Laboratory (Common to B.E. CSE & B.Tech IT programmes)	PC	4	0	0	4	2
8.	20CS5L2	Software Engineering Laboratory (Common to B.E. CSE & B.Tech IT programmes)	PC	4	0	0	4	2
9.	20EC5L3	Microcontrollers and Embedded Systems Laboratory (Common to B.E. CSE & B.Tech IT programmes)	PC	4	0	0	4	2
TOTAL				29	16	1	12	22

SEMESTER VI

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	20HS602	Principles of Management (Common to B.E. CSE & B.Tech IT programmes)	HS	3	3	0	0	3
2.	20CS601	Mobile Architecture and Programming	PC	3	3	0	0	3
3.	20CS602	Cryptography and Network Security	PC	3	3	0	0	3
4.	20CS603	Compiler Design	PC	3	3	0	0	3
5.		Professional Elective I	PE	3	3	0	0	3
6.	20MC601	Essence of Indian Traditional Knowledge (Common to all B.E. / B.Tech programmes)	MC	1	1	0	0	-
THEORY CUM PRACTICAL								
7.	20CS604	Machine Learning (Common to B.E. ECE, B.E. CSE & B.Tech IT programmes)	PC	5	3	0	2	4
PRACTICAL								
8.	20CS6L1	Mobile Application Development Laboratory (Common to B.E. CSE & B.Tech IT programmes)	PC	4	0	0	4	2
9.	20CS6L2	Web Technology Laboratory	PC	4	0	0	4	2
TOTAL				29	19	0	10	23

SEMESTER VII

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	20CS701	Data Analytics (Common to B.E. CSE & B.Tech IT programmes)	PC	3	3	0	0	3
2.	20CS702	Artificial Intelligence	PC	3	3	0	0	3
3.		Open Elective II	OE	3	3	0	0	3
4.		Professional Elective II	PE	3	3	0	0	3
5.		Professional Elective III	PE	3	3	0	0	3
PRACTICAL								
6.	20CS7L1	Data Analytics Laboratory (Common to B.E. CSE & B.Tech IT programmes)	PC	4	0	0	4	2
7.	20CS7L2	Mini Project	EEC	4	0	0	4	2
TOTAL				23	15	0	8	19

SEMESTER VIII

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Professional Elective IV	PE	3	3	0	0	3
2.		Professional Elective V	PE	3	3	0	0	3
PRACTICAL								
3.	20CS8L1	Project Work	EEC	20	0	0	20	10
TOTAL				26	6	0	20	16

TOTAL NO. OF CREDITS: 168

PROFESSIONAL ELECTIVE (PE)**SEMESTER VI
ELECTIVE I**

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20CS6A1	Data Warehousing and Data Mining	PE	3	3	0	0	3
2.	20CS6A2	Computer Graphics and Multimedia	PE	3	3	0	0	3
3.	20CS6A3	Graph Theory and Applications	PE	3	3	0	0	3
4.	20CS6A4	System Software	PE	3	3	0	0	3
5.	20HS6A2	Entrepreneurship Development	PE	3	3	0	0	3
6.	20IT6A2	Software Testing	PE	3	3	0	0	3
7.	20IT6A4	Real Time Systems	PE	3	3	0	0	3

**SEMESTER VII
ELECTIVE II**

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20CS7A1	Cloud Computing	PE	3	3	0	0	3
2.	20CS7A2	Agile Methodologies	PE	3	3	0	0	3
3.	20CS7A3	Java Scripting	PE	3	3	0	0	3
4.	20CS7A4	Natural Language Processing	PE	3	3	0	0	3
5.	20CS7A5	Advanced Topics on Databases	PE	3	3	0	0	3
6.	20IT601	Internet of Things	PE	3	3	0	0	3
7.	20HS7A2	Total Quality Management	PE	3	3	0	0	3

**SEMESTER VII
ELECTIVE III**

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20CS7B1	C# and .Net Programming	PE	3	3	0	0	3
2.	20CS7B2	Wireless Adhoc and Sensor Networks	PE	3	3	0	0	3
3.	20CS7B3	Multi-core Architectures and Programming	PE	3	3	0	0	3
4.	20CS7B4	Distributed Systems	PE	3	3	0	0	3
5.	20IT7B2	User Interface Design	PE	3	3	0	0	3
6.	20IT7B4	Service Oriented Architecture	PE	3	3	0	0	3
7.	20HS601	Operations Research	PE	3	3	0	0	3

**SEMESTER VIII
ELECTIVE IV**

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20CS8A1	Social Network Analysis	PE	3	3	0	0	3
2.	20CS8A2	Software Defined Networks	PE	3	3	0	0	3
3.	20CS8A3	Digital Forensics	PE	3	3	0	0	3
4.	20CS8A4	Soft Computing	PE	3	3	0	0	3
5.	20IT7B1	Cyber Physical Systems	PE	3	3	0	0	3
6.	20IT8A2	Information Security	PE	3	3	0	0	3
7.	20EC8A3	Robotics and Automation	PE	3	3	0	0	3

**SEMESTER VIII
ELECTIVE V**

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20CS8B1	Information Retrieval Techniques	PE	3	3	0	0	3
2.	20CS8B2	Green Computing	PE	3	3	0	0	3
3.	20CS8B3	Virtual Reality and Augmented Reality	PE	3	3	0	0	3
4.	20CS8B4	Blockchain Technology	PE	3	3	0	0	3
5.	20IT8B2	Software Project Management	PE	3	3	0	0	3
6.	20HS6A1	Intellectual Property Rights	PE	3	3	0	0	3
7.	20HS8B2	Economics for Engineers	PE	3	3	0	0	3

OPEN ELECTIVE I (OE I)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20OE103	Refrigeration and Air Conditioning	OE	3	3	0	0	3
2.	20OE201	Fundamentals of Renewable Energy System	OE	3	3	0	0	3
3.	20OE202	Principles of Measurements and Instrumentation	OE	3	3	0	0	3
4.	20OE203	Introduction to Nanoscience	OE	3	3	0	0	3
5.	20OE303	Fundamentals of Wireless Communication	OE	3	3	0	0	3
6.	20OE601	Fundamentals of Electric Vehicles	OE	3	3	0	0	3
7.	20OE602	Supply Chain Management	OE	3	3	0	0	3
8.	20OE603	Automotive Safety Systems	OE	3	3	0	0	3
9.	20OE701	Biomedical Instrumentation and Measurements	OE	3	3	0	0	3
10.	20OE801	Linear Algebra and Number Theory	OE	3	3	0	0	3

OPEN ELECTIVE II (OE II)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20OE106	Fundamentals of Product Design	OE	3	3	0	0	3
2.	20OE108	Industrial Safety Practices	OE	3	3	0	0	3
3.	20OE206	Fundamentals of Fibre Optics and Lasers	OE	3	3	0	0	3
4.	20OE305	Fundamentals of Image Processing	OE	3	3	0	0	3
5.	20OE306	Consumer Electronics	OE	3	3	0	0	3
6.	20OE308	Introduction to VLSI Technology	OE	3	3	0	0	3
7.	20OE507	Concepts of Ethical Hacking	OE	3	3	0	0	3
8.	20OE605	Lean Manufacturing Practices	OE	3	3	0	0	3
9.	20OE706	Industrial Computer Networks	OE	3	3	0	0	3
10.	20OE708	Instrumentation for Agro Food Industry	OE	3	3	0	0	3

OPEN ELECTIVE - I (V SEMESTER) - offered to other Departments

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20OE401	Fundamentals of Artificial Intelligence	OE	3	3	0	0	3
2.	20OE402	Introduction to Database Management Systems	OE	3	3	0	0	3
3.	20OE403	Computer Communication Networks	OE	3	3	0	0	3
4.	20OE404	Cloud Infrastructure and Technologies	OE	3	3	0	0	3

OPEN ELECTIVE - II (VII SEMESTER) - offered to other Departments

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20OE405	Machine Learning Techniques	OE	3	3	0	0	3
2.	20OE406	Java Script Programming	OE	3	3	0	0	3
3.	20OE407	Computer Graphics	OE	3	3	0	0	3
4.	20OE408	Essentials of Data Analytics	OE	3	3	0	0	3

HUMANITIES AND SOCIAL SCIENCES (HS)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20HS101	English for Technical Communication	HS	3	3	0	0	3
2.	20HS201	Advanced Technical Communication	HS	3	3	0	0	3
3.	20HS2L1	Communication Skills Laboratory	HS	2	0	0	2	1
4.	20HS301	Universal Human Values	HS	3	2	1	0	3
5.	20HS401	Environmental Science and Engineering	HS	2	2	0	0	2
6.	20HS602	Principles of Management	HS	3	3	0	0	3
Total Credits (HS)								15

BASIC SCIENCES (BS)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20BS101	Fundamentals of Engineering Mathematics	BS	4	3	1	0	4
2.	20BS102	Engineering Physics	BS	3	3	0	0	3
3.	20BS103	Engineering Chemistry	BS	3	3	0	0	3
4.	20BS1L1	Basic Science Laboratory	BS	3	0	0	3	1.5
5.	20BS201	Laplace Transform and Advanced Calculus	BS	4	3	1	0	4
6.	20BS204	Physics for Information Science	BS	3	3	0	0	3
7.	20BS303	Discrete Mathematics	BS	4	3	1	0	4
8.	20BS403	Probability, Statistics and Queuing Theory	BS	4	3	1	0	4
Total Credits (BS)								26.5

PROFESSIONAL CORE (PC)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20CS201	Programming in C	PC	3	3	0	0	3
2.	20CS2L1	C Programming Laboratory	PC	4	0	0	4	2
3.	20CS302	Data Structures and Algorithms	PC	3	3	0	0	3
4.	20CS3L2	Data Structures and Algorithms Laboratory	PC	4	0	0	4	2

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
5.	20CS3L3	Object Oriented Programming Laboratory	PC	4	0	0	4	2
6.	20CS401	Computer Organization and Architecture	PC	3	3	0	0	3
7.	20CS402	Database Management Systems	PC	3	3	0	0	3
8.	20CS403	Design and Analysis of Parallel Algorithms	PC	3	3	0	0	3
9.	20CS404	Operating Systems	PC	5	3	0	2	4
10.	20CS4L1	Database Management Systems Laboratory	PC	4	0	0	4	2
11.	20CS501	Computer Networks	PC	3	3	0	0	3
12.	20CS502	Software Engineering	PC	3	3	0	0	3
13.	20CS503	Theory of Computation	PC	4	3	1	0	4
14.	20EC506	Microcontrollers and Embedded Systems	PC	3	3	0	0	3
15.	20CS5L1	Networks Laboratory	PC	4	0	0	4	2
16.	20CS5L2	Software Engineering Laboratory	PC	4	0	0	4	2
17.	20EC5L3	Microcontrollers and Embedded Systems Laboratory	PC	4	0	0	4	2
18.	20CS601	Mobile Architecture and Programming	PC	3	3	0	0	3
19.	20CS602	Cryptography and Network Security	PC	3	3	0	0	3
20.	20CS603	Compiler Design	PC	3	3	0	0	3
21.	20CS604	Machine Learning	PC	5	3	0	2	4
22.	20CS6L1	Mobile Application Development Laboratory	PC	4	0	0	4	2
23.	20CS6L2	Web Technology Laboratory	PC	4	0	0	4	2
24.	20CS701	Data Analytics	PC	3	3	0	0	3
25.	20CS702	Artificial Intelligence	PC	3	3	0	0	3
26.	20CS7L1	Data Analytics Laboratory	PC	4	0	0	4	2
Total Credits (PC)								71

ENGINEERING SCIENCES (ES)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20GE101	Problem Solving using Python Programming	ES	3	3	0	0	3
2.	20GE1L1	Python Programming Laboratory	ES	4	0	0	4	2
3.	20GE1L2	Industrial Practices Workshop	ES	3	0	0	3	1.5
4.	20GE201	Engineering Graphics	ES	4	2	0	2	3
5.	20GE205	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3
6.	20CS301	Digital Principles and System Design	ES	4	3	1	0	4
7.	20EC304	Analog and Digital Communication	ES	3	3	0	0	3
8.	20CS3L1	Digital Systems Laboratory	ES	4	0	0	4	2
Total Credits (ES)								21.5

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20HS4L2	Professional Communication Laboratory	EEC	2	0	0	2	1
2.	20CS7L2	Mini Project	EEC	4	0	0	4	2
3.	20CS8L1	Project Work	EEC	20	0	0	20	10
Total Credits (EEC)								13

MANDATORY COURSES (MC)

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20MC501	Constitution of India	MC	1	1	0	0	-
2.	20MC601	Essence of Indian Traditional Knowledge	MC	1	1	0	0	-
Total Credits (MC)								3

SUMMARY

S.NO.	CATEGORY	NUMBER OF CREDITS									Total Credits	Credit %
		I SEM	II SEM	III SEM	IV SEM	V SEM	VI SEM	VII SEM	VIII SEM			
1.	Humanities and Social Sciences (HS)	3	4	3	2		3				15	8.93
2.	Basic Sciences (BS)	11.5	7	4	4						26.5	15.77
3.	Engineering Sciences (ES)	6.5	6	9							21.5	12.80
4.	Employability Enhancement Courses (EEC)				1			2	10		13	7.74
5.	Professional Core (PC)		5	7	15	19	17	8			71	42.26
6.	Professional Elective (PE)						3	6	6		15	8.93
7.	Open Elective (OE)					3		3			6	3.57
8.	Mandatory Courses (MC)					-	-				-	
Credits per Semester		21	22	23	22	22	23	19	16		168	
Credits per Year		43		45		45		35			168	
Total Credits		168										

20HS101	ENGLISH FOR TECHNICAL COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- This course is designed for entry level Engineering and Technology curriculum enabling the students to learn, acquire and apply for their learning and career.
- The course is aimed at providing effective skills for promoting communication skills through English.
- Students will benefit in conversing with the peers, faculty and fellow professionals.
- The outcome of this course contains refined level of English proficiency by acquiring all four skills, listening, speaking, reading and writing to prepare them for global readiness.

PRE-REQUISITE: NIL

UNIT-I FOCUSING LANGUAGE DEVELOPMENT 9

Listening: Listening to TV News, Guest Lecturers, Note – taking. **Speaking:** Pronunciation Common Vocabulary – Technical Vocabulary – Answering Peer Questions – Conversation with Teacher. **Reading:** News magazines, Reading for unfamiliar words, Variety of News Items

Writing: Word formation – Auxiliary verbs – Modal Verbs – Sentence Types – Affirmative, Negative, Interrogative, Concord – Dialogue Writing, Letter to Principal / Director – Instructions using Auxiliary

UNIT-II GRAMMAR AND TECHNICAL READING 9

Listening: Listening to Peer Conversations – Brief Speeches – Listening for Specific Information – Recap of Speeches. **Speaking:** Wh Questions, Day today conversations, Telephonic enquiries official/formal enquiries. **Reading:** Technical Essays – Identifying Sentence Types – Classifying the verb patterns. **Writing:** Tenses – Simple Present, Present Progressive, Present Perfect, Present Perfect Continuous – Voice – Active & Passive – Précis Writing – Essay Writing

UNIT - III GRAMMAR AND LANGUAGE DEVELOPMENT 9

Listening: TV interviews, Commentaries, Digital Videos for World Information. **Speaking:** Telephonic Conversation – Classroom Activities – Conversing Information. **Reading:** Coherence, Development of Thoughts. **Writing:** Tenses – Simple Past, Past Progressive, Past Perfect, Past perfect continuous – Impersonal Passive-Narrating the past events, Letter to friend/father about Industrial Visit/Functions held – Narrating the past experience using Impersonal Passive voice

UNIT - IV READING AND LANGUAGE DEVELOPMENT 9

Listening: Listening to Dialects of English – British & American Regional. **Speaking:** Role Plays, Extempore, Responding to specific questions. **Reading:** Comprehensive passages, Reading for specific points. **Writing:** Tenses – Simple Future, Future progressive, Future Perfect, Future Perfect continuous – Definition – Phrases of Reason – Cause & Effect, Recommendations, Argumentative Essays, Letter to the Editor on Social Issues – Analytical Essays on Social hazards using Cause and Effect

UNIT - V EXTENDED WRITING

9

Listening: Listening to Technical Seminar speeches – Listening to achievers, eminent personalities – Dialects – Australian – African – Asian. **Speaking:** Welcome address, Compeering, Vote of Thanks, Peer debates. **Reading:** Texts on self-confidence, motivation, success path. **Writing:** Contracted forms, Conditionals, Articles, Preposition, Tense – ‘going to’ - Error Spotting, Sequence Words – Rearranging – Writing a Book Review – Summary writing – Rearranging Sentences using Sequence Words, Note Making

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Board of Editors. Using English “A Course book for Undergraduate Engineers and Technologists”. Orient Black Swan Limited, Hyderabad, 2015
2. Richards, C. Jack. “Interchange Students’ Book-2” New Delhi: CUP, 2015

REFERENCES:

1. Murphy, “Raymond English Grammar in Use with Answers: Reference and Practice for Intermediate Students”, Cambridge: CUP, 2004
2. Thomson, A.J. and Martinet, A.V. A Practical English Grammar, OUP, New Delhi: 1986 Anne Laws, “Writing Skills”, Orient Black Swan, Hyderabad, 2011
Board of Editor, “English for Technical Communication”, Great Mind Publication, Chennai, 2018

Course Name : English for Technical Communication										Course Code: 20HS101				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C101.1	Listen, Comprehend and Correspond with others at various contexts									1-5	AD	9,10,12	-	
C101.2	Speak legibly and fluently under various life-time situations by applying proper communication modules									1-5	AD	9,10,12	-	
C101.3	Read and understand a variety of writings and technical text by analyzing the meaning and language									1-5	AD	9,10,12	-	
C101.4	Apply clear and legible writing skills in error free style in coherent manner									1-5	AD	9,10,12	-	
C101.5	Remember and use various communicative skills in precise and efficient way on technological contexts									1-5	AD	9,10,12	-	
C101.6	Form situational conversations and technical writing styles for interpersonal and effective communication									1-5	AD	9,10,12	-	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C101.1	-	-	-	-	-	-	-	-	3	3	-	2	-	-
C101.2	-	-	-	-	-	-	-	-	3	3	-	2	-	-
C101.3	-	-	-	-	-	-	-	-	2	3	-	2	-	-
C101.4	-	-	-	-	-	-	-	-	2	3	-	2	-	-
C101.5	-	-	-	-	-	-	-	-	3	3	-	2	-	-
C101.6	-	-	-	-	-	-	-	-	3	3	-	2	-	-
C101	-	-	-	-	-	-	-	-	3	3	-	2	-	-

20BS101

**FUNDAMENTALS OF ENGINEERING
MATHEMATICS**

L	T	P	C
3	1	0	4

OBJECTIVES:

- To relate various methods of Matrix Algebra to handle practical problems arising in the field of engineering.
- The main aim of this course is to achieve conceptual understanding and to retain the best traditions of Calculus.
- The syllabus is designed to provide the basic tools of Calculus of Single and Multivariable, mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions.

PRE-REQUISITE:NIL

UNIT-I MATRICES

12

Introduction to Matrices-Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton Theorem – Diagonalization of matrices – Reduction of a Quadratic form to Canonical form by Orthogonal transformation – Nature of Quadratic forms.

UNIT-II DIFFERENTIAL CALCULUS

12

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Differentiation of Polynomials, Exponential, Trigonometric, Hyperbolic, Logarithmic and Implicit functions- Maxima and Minima of functions of single variable.

UNIT - III FUNCTIONS OF SEVERAL VARIABLES

12

Partial differentiation – Homogeneous functions and Euler’s theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor’s series for functions of two variables – Maxima and Minima of functions of two variables – Lagrange’s method of undetermined multipliers.

UNIT - IV INTEGRAL CALCULUS

12

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

UNIT - V ORDINARY DIFFERENTIAL EQUATIONS

12

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 44th Edition, 2017.
2. T. Veerarajan., “Engineering Mathematics I”, The Tata Mc Graw Hill Publication-New Delhi, First Edition, 2018

REFERENCES:

1. James Stewart, “Calculus, Early Transcendental”, Cengage Learning, 7thEdition, New

- Delhi, 2015. [For units II & III].
2. 2. Kreyszig Erwin, “Advanced Engineering Mathematics”, John Wiley and Sons, 9thEdition, New Delhi, 2006.
 3. Wiley, “Calculus- International Student version”, 10thEdition, Wiley India Pvt. Ltd, New Delhi 2017.
 4. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 5th Edition , 2016.
 5. Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics II”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 9thEdition, 2014.

Course Name : Fundamentals of Engineering Mathematics		Course Code: BS101												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
C102.1	Determine the Eigen values, Eigen vectors to diagonalize a matrix and reduce quadratic form to canonical form.	1	K3	1, 2, 3, 8&9	1									
C102.2	Apply the concept of limits, continuity, rules of differentiation, techniques of differentiation to differentiate standard functions.	2	K3	1, 2, 3, 8&9	1									
C102.3	Apply the concepts of Concavity, Convexity to determine the critical points, point of Inflection, Maxima and Minima of Single variable functions.	2	K3	1, 2, 3, 8&9	1									
C102.4	Compute the derivatives of functions of two variables and apply them to calculate the maxima and minima.	3	K3	1, 2, 3, 8&9	1									
C102.5	Determine integrals using techniques of integration, such as substitution, partial fractions and integration by parts.	4	K3	1, 2, 3, 8&9	1									
C102.6	Apply various techniques to solve higher order differential equations with constant and variable Coefficients.	5	K3	1, 2, 3, 8&9	1									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C102.1	3	2	1	-	-	-	-	1	1	-	-	-	2	-
C102.2	3	2	1	-	-	-	-	1	1	-	-	-	2	-
C102.3	3	2	1	-	-	-	-	1	1	-	-	-	2	-
C102.4	3	2	1	-	-	-	-	1	1	-	-	-	2	-
C102.5	3	2	1	-	-	-	-	1	1	-	-	-	2	-
C102.6	3	2	1	-	-	-	-	1	1	-	-	-	2	-
C102	3	2	1	-	-	-	-	1	1	-	-	-	2	-

20BS102

ENGINEERING PHYSICS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To inculcate the fundamental knowledge in properties of matter and crystal physics.
- To enrich the knowledge on Laser, fiber optics and ultrasonics and their applications relevant to various streams of Engineering and Technology.
- To introduce quantum physics and its applications

PRE-REQUISITE:NIL**UNIT-I PROPERTIES OF MATTER 9**

Elasticity – Hooke's Law – Stress-strain diagram and its uses – Three modulus of elasticity (qualitative) – Poisson's ratio – factors affecting elastic modulus and tensile strength – twisting couple – torsional pendulum: theory and experiment – bending of beams – bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment – I - shaped girders.

UNIT-II LASER AND FIBER OPTICS 9

Lasers: Interaction of radiation with atomic energy states – Einstein's A and B coefficients derivation – Population inversion – resonant cavity, optical amplification (qualitative) – solid state lasers – Nd:YAG laser, Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle – types of optical fibers (material, refractive index, mode) – losses associated with optical fibers – fiber optic sensors: pressure and displacement sensor.

UNIT - III ULTRASONICS 9

Ultrasonics – classification (qualitative) – properties – generation – magnetostriction and piezoelectric methods – detection of ultrasound – cavitations – velocity measurement – acoustic grating – Industrial applications (Drilling, Welding, Soldering and Cleaning) – SONAR – NDT – Pulse Echo system through Transmission and Reflection modes – A, B and C scan displays - Medical application – sonogram

UNIT - IV QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – wave function and its physical significance – Schrodinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunneling (qualitative) – scanning tunneling microscope.

UNIT - V CRYSTAL PHYSICS 9

Crystalline and amorphous materials – unit cell, crystal systems, Bravais lattices, lattice planes - Miller indices – Inter planar spacing in cubic lattice – coordination number and packing factor for SC, BCC, FCC, HCP structures – growth of single crystals: solution and melt growth techniques – Mechanisms of plastic deformation, slip and twinning

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. R. K. Gaur and S. L. Gupta, "Engineering Physics", Dhanpat Rai Publications, 2012.
2. B. K. Pandey and S. Chaturvedi, "Engineering Physics", Cengage Learning India, 2018.

- V.Rajendran, "Engineering Physics", Tata McGraw Hill Education Private Limited, 2011

REFERENCES:

- D.Halliday, R. Resnick and J. Walker, "Principles of Physics", Wiley publisher, 10th Edition, 2015.
- R.A.Serway and J.W. Jewett, "Physics for Scientists and Engineers", Cengage Learning, 2014.
- P.A.Tipler and G. Mosca, "Physics for Scientists and Engineers with Modern Physics", W.H.Freeman, 2007.
- D.K.Bhattacharya and T. Poonam, "Engineering Physics", Oxford University Press, 2017.

Course Name : Engineering Physics		Course Code : 20BS102												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
C103.1	Demonstrate the properties of elasticity and measure the different moduli of elasticity	1	K3	1, 2, 3	1									
C103.2	Discuss the characteristics of laser and optical fiber	2	K2	1, 2, 8,9,1	1									
C103.3	Explain the concepts of ultrasonics in engineering	3	K2	1, 2, 8,9,1	1									
C103.4	Explain black body radiation, properties of matter waves and Schrodinger equation	4	K2	1, 2, 8,9,1	1									
C103.5	Classify the Bravais lattices and different types of crystal structures	5	K3	1, 2, 3	1									
C103.6	Summarize the information on growth of crystals and deformations	5	K2	1, 2, 8,9,1	1									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C103.1	3	2	1	-	-	-	-	-	-	-	-	-	1	-
C103.2	2	1	-	-	-	-	-	1	1	1	-	-	1	-
C103.3	2	1	-	-	-	-	-	1	1	1	-	-	1	-
C103.4	2	1	-	-	-	-	-	1	1	1	-	-	1	-
C103.5	3	2	1	-	-	-	-	-	-	-	-	-	1	-
C103.6	2	1	-	-	-	-	-	1	1	1	-	-	1	-
C103	2	1	1	-	-	-	-	1	1	1	-	-	1	-

20BS103

ENGINEERING CHEMISTRY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To make the students, familiar with boiler feed water requirements, related problems and water treatment techniques.
- To learn the principle of electrochemical cell, types of corrosion and its control.
- To develop an understanding of the basic concepts of phase rule and its applications to one and two component systems and appreciate the purpose and significance of alloys.
- To be familiar with different types of fuel and their characteristics and also functioning of energy storage devices.
- To understand the techniques of spectra and chromatography for analytical purpose

PRE-REQUISITE:NIL**UNIT-I WATER AND ITS TREATMENT 9**

Characteristics of water; Hard water, Soft water, difference; Hardness – types of hardness, expression of hardness, units, removal of hardness (boiling, soda lime process), estimation of hardness of water by EDTA method (problems); Boiler feed water – requirements – disadvantages of using hard water in boilers (scale and sludge, priming and foaming, caustic embrittlement, boiler corrosion); Treatment of boiler feed water – internal treatment (carbonate, phosphate, and calgon conditioning) external treatment – ion exchange process, zeolite process; Purification of water- reverseosmosis, electro dialysis, Application of nanomaterials in water purification.

UNIT-II ELECTROCHEMISTRY AND CORROSION 9

Electrochemical cell - redox reaction, electrode potential- origin of electrode potential-oxidation potential- reduction potential, - electrochemical series and its significance - Nernst equation (derivation and problems).
Corrosion- causes- factors, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method – corrosion inhibitors. Metallic coating – Electroplating – Factors - Electroplating of Copper and Electroless plating of Nickel.

UNIT - III PHASE RULE AND ALLOYS 9

Phase rule - introduction, definition of terms with examples; One component system - water system; Reduced phase rule - two component system, classification, lead-silver system; Alloys – introduction, definition, properties of alloys, significance of alloying; Functions and effects of alloying elements; Heat treatment of steel - annealing, hardening, tempering, carburizing, nitriding; Ferrous alloys- nichrome and stainless steel (18/8); Non-ferrous alloys – brass and bronze

UNIT - IV FUELS AND BATTERIES 9

Fuels – classification, characteristics; Petrol – characteristics, knocking, octane number; Diesel – characteristics, cetane number; Natural gas (CNG), LPG, Power alcohol, Biodiesel, Gasohol; Combustion of fuels – calorific value, GCV and NCV (Problems), calculation of

theoretical air for combustion (Problems), Ignition temperature, explosive range, flue gas analysis (Orsatapparatus);

Batteries – primary and secondary batteries, lead-acid battery, lithium ion battery, Fuel cell (hydrogen oxygen fuel cell).

UNIT - V ANALYTICAL TECHNIQUES

9

Spectroscopic techniques – UV-visible (Principle and Instrumentation – Block Diagram only and applications), IR (Principle and Instrumentation – Block Diagram only and applications), ¹HNMR (Principle and Instrumentation – Block Diagram only) – Chromatography – HPLC - Flame photometry – Estimation of sodium by Flame photometry

TOTAL: 45 PERIODS

TEXT BOOKS:

1. P.C. Jain and Monika Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2017
2. S.S Dara and S.S Umare, "A Text Book of Engineering Chemistry", S.Chand& Company Limited, 20th Edition, 2018

REFERENCES:

1. Shashi Chawla, "A Textbook of Engineering Chemistry", Dhanpat Rai & CO. (PVT) LTD, New Delhi, 2012.
2. B.R. Puri, L.R. Sharma, M.S. Pathania, Vishal, "Principles of Physical Chemistry", Vishal Publishing Co., Punjab, 47th Edition, 2017.
3. G Palanna, "Engineering Chemistry", McGraw Hill Education (India) PVT, LTD, Chennai, 2017.
4. Dr. Sunita Rattan, "A Textbook of Engineering Chemistry", S.K.Kataria & Sons, New Delhi, 2012

Course Name : Engineering Chemistry		Course Code: 20BS103													
CO	Course Outcomes	Unit	K-CO	POs	PSOs										
C104.1	Determine the hardness of water and explain the water treatment methods.	I	K2	1,2,6,7	-										
C104.2	Apply Nernst equation to determine the EMF of the cell and explain various corrosion control methods.	II	K3	1,2,3,6,7	1										
C104.3	Describe the phase diagram of one component and two component system and various methods of heat treatment of steel.	III	K2	1,2,6,7	-										
C104.4	Classify the various types of fuels by their characteristics and explain the flue gas analysis by Orsat method.	IV	K2	1,2,6,7	1										
C104.5	Illustrate the working of Lead acid battery, lithium ion battery and fuel cell.	IV	K2	1,2,6,7	1										
C104.6	Describe the instrumentation and working of UV, IR, ¹ HNMR, HPLC and flame photometry.	V	K2	1,2,6,7	1										
CO-PO Mapping															
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
C104.1	2	2	-	-	-	1	1	-	-	-	-	-	-	-	
C104.2	3	2	1	-	-	1	1	-	-	-	-	-	1	-	
C104.3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	
C104.4	2	1	-	-	-	1	1	-	-	-	-	-	1	-	
C104.5	2	1	-	-	-	1	1	-	-	-	-	-	1	-	
C104.6	2	1	1	-	-	1	1	-	-	-	-	-	1	-	
C104	2	1	1	-	-	1	1	-	-	-	-	-	1	-	

20GE101	PROBLEM SOLVING USING PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To know the basics of Computers and algorithmic problem solving
- To understand Python programs with conditional and looping constructs.
- To define Python functions and strings.
- To use Python data structures – lists, tuples, sets and dictionaries.
- To do input/output with files in Python.

PRE-REQUISITE:NIL

UNIT-I COMPUTER FUNDAMENTALS AND PROBLEM SOLVING 9

Introduction to Computer System – Block Diagram of Computer, Types of Memory, I/O Devices, Application Programs, System Programs – Loader, linker, assembler, compiler, interpreter, Programming process – source code to executable code, Problem Solving Strategies – Problem analysis, Algorithms, Flow Charts, Pseudo Code. Illustrative problems: odd or even number, Leap year, Biggest of three numbers, square root of a number, Sum of n numbers, Armstrong number, Palindrome, Fibonacci Series, Prime number, Bubble Sort and Linear Search.

UNIT-II DATA, EXPRESSIONS, CONTROL FLOW STATEMENTS 9

Python interpreter and interactive mode, values and types – int, float, boolean, string, and list, variables, expressions, statements, tuple assignment, operators and precedence of operators, comments, Control Flow Statements – Conditionals – conditional (if), alternative (if-else), chained conditional (if-elif-else), Iteration – state, while, for, break, continue, pass, Illustrative programs – exchange the values with and without using temporary variables, circulate the values of n variables, distance between two points.

UNIT - III FUNCTIONS, STRINGS 9

Functions – function definition and use, flow of execution, parameters and arguments, function composition, Fruitful functions – return values, parameters, local and global scope, recursion, Strings – string slices, immutability, string functions and methods, string module, Illustrative programs – square root, GCD, exponentiation, Factorial of a number, linear search, binary search

UNIT - IV LISTS, TUPLES, SETS, DICTIONARIES 9

Lists – list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters, Lists as arrays, Tuples – tuple assignment, tuple as return value, Sets - Creating a set, Modifying a set, Removing elements from a set, Set operations- Set Union, Set intersection, Set difference, Set membership test, Iterating through a set, Set methods, Built-in functions with set, Frozen set - Dictionaries – operations and methods, Advanced list processing –List comprehension, Illustrative programs – selection sort, insertion sort, Matrix addition and subtraction, sum an array of numbers

UNIT - V FILES, MODULES, PACKAGES 9

Files and exception – text files, reading and writing files, format operator, command line arguments, errors and exceptions, handling exceptions, modules, packages – Math and

Rand, Illustrative programs – word count, copy file, merge two files.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. E. Balagurusamy, “Problem solving and Python Programming”, First edition, McGraw Hill Education (India) Private Limited, 2017.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016
(<http://greenteapress.com/wp/think-python/>)

REFERENCES:

1. Yashavant Kanetkar, Aditya Kanetkar, “Let Us Python”, 2nd Edition, BPB Publications, 2020.
2. John V Guttag, “Introduction to Computation and Programming Using Python: With Application to Understanding Data”, 2nd Edition, PHI Publisher, 2017.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach”, Pearson India Education Services Pvt. Ltd., 2016.
4. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd., 2015.
5. Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3.6”, 3rd edition, Shroff/O’ Reilly Publishers, 2018.
6. Dr.A.Kannan, Dr.L.SaiRamesh, “Problem Solving and Python Programming”, Updated Edition, United Global Publishers Pvt. Ltd., April 2018

Course Name : Problem Solving using Python Programming										Course Code: 20GE101				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C105.1	Explain Components of a Computer System, types of programming languages, types of software with examples and purpose.									I	K3	1,2	1,2	
C105.2	Perform problem analysis, use algorithms and prepare flow charts, pseudo code for solving simple problems.									I	K3	1,2	1,2	
C105.3	Use Conditional, iteration constructs of python programming and apply to solve simple problems									II	K3	1,2,3	1,2	
C105.4	Use Functions, recursive function, String functions in python programming and apply to perform linear and binary search									III	K3	1,2,3	1,2	
C105.5	Explain the various operations for manipulating Tuples, Dictionaries and Use List toper form simple and sorting operations									IV	K3	1,2,3	1,2	
C105.6	Explain file handling operations, exception handling, modules and packages and illustrate programs for word count, file copy, merge operations and exception handling.									V	K3	1,2,3	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C105.1	2	1	-	-	-	-	-	1	1	-	-	2	2	1
C105.2	2	1	-	-	-	-	-	1	1	-	-	2	2	1
C105.3	3	2	1	-	-	-	-	1	1	-	-	2	2	1
C105.4	3	2	1	-	-	-	-	1	1	-	-	2	2	1
C105.5	3	2	1	-	-	-	-	1	1	-	-	2	2	1
C105.6	3	2	1	-	-	-	-	1	1	-	-	2	2	1
C105	3	2	1	-	-	-	-	1	1	-	-	2	2	1

20BS1L1

BASIC SCIENCE LABORATORY
PHYSICS LABORATORY

L	T	P	C
0	0	3	1.5

OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in Optics, properties of matter and liquids

PRE-REQUISITE:NIL**LIST OF EXPERIMENTS****(Any five to be carried out & one demonstration experiment)**

1. Determination of Rigidity modulus – Torsional Pendulum.
2. Determination of Young’s modulus – Non Uniform Bending.
3. a. Determination of wavelength and particle size using diode laser.
b. Determination of acceptance angle in an optical fiber.
4. Determination of velocity of sound and compressibility of liquid using ultrasonic interferometer.
5. Determination of band gap of a semiconductor diode.
6. Determination of thickness of a thin wire – Air wedge method.
7. Determination of dispersive power of a prism – Spectrometer*
8. Determination of wavelength of mercury spectrum – Spectrometer grating

*Demonstration experiment

TOTAL: 45 PERIODS**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS**

S. No.	NAME OF THE EQUIPMENT	Qty.
1	Torsional pendulum set	6
2	Travelling microscope & accessories	6
3	Laser kit	6
4	Ultrasonic interferometer	6
5	Semiconductor band gap kit	6
6	Air wedge set up	6
7	Spectrometer & prism	6
8	Spectrometer & Grating	6

CHEMISTRY LABORATORY**OBJECTIVES:**

- To make the students to acquire practical skill in the determination of water quality parameters through volumetric analysis.
- To have hands on experience in using instruments like pH meter, conductivity meter, potentiometer.
- To acquaint the students with the determination of molecular weight of polymer by viscometer.

PRE-REQUISITE:NIL**Any Five experiments to be given**

1. Determination of total, temporary & permanent hardness of water by EDTA method.
2. Determination of alkalinity in water sample.
3. Determination of dissolved oxygen content of water sample by Winkler's method.
4. Determination of strength of given hydrochloric acid using pH meter.
5. Estimation of iron content of the given solution using potentiometer.
6. Conductometric titration of a strong acid Vs a strong base.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
9. Corrosion Experiment – Weight Loss Method.
10. Estimation of sodium present in water using flame photometer.

TOTAL(PHYSICS & CHEMISTRY): 45 PERIODS**LIST OF APPARATUS AND EQUIPMENT FOR A BATCH OF 30 STUDENTS**

S. No.	NAME OF THE EQUIPMENT	Qty.
1	Burette	30
2	Pipette	30
3	Beaker (100ml)	30
4	Conical Flask (250ml)	30
5	Conductivity meter	10
6	Potentiometer	10
7	pH meter	10
8	Viscometer	10
9	Flame Photometer	1
10	Electronic Balance	1

REFERENCES:

1. Vogel's "Text book of quantitative chemical analysis" (8th edition, 2014)

Course Name : BASIC SCIENCE LABORATORY							Course Code: 20BS1L1							
CO	Course Outcomes						Exp. No	K-CO	POs	PSOs				
PHYSICS														
C106.1	Calculate rigidity modulus and Young's modulus of a given material.						1,2	K3	1,2,8,9,10	1				
C106.2	Examine the size of a given particle, parameters of optical fiber and compute the thickness of a given thin wire.						3,6	K3	1,2,8,9,10	1				
C106.3	Discover the velocity of ultrasound, compressibility of a given liquid and band gap of a given semiconductor diode.						4,5	K3	1,2,8,9,10	1				
C106.4	Predict dispersive power of prism and wavelength of mercury spectrum.						7,8	K2	1,2,8,9,10	1				
CHEMISTRY														
C106.5	Estimate the Chemical quality parameter of a water sample.						1,2,3	K3	1,2,3,8,9,10	-				
C106.6	Estimate the strength of acid by conductometric and pH metric titration.						4,6,7	K3	1,2,3,8,9,10	-				
C106.7	Estimate the amount of iron content in a given solution using potentiometer and the amount of sodium in water using flame photometer.						5,10	K3	1,2,3,8,9,10	-				
C106.8	Determine the molecular weight of polyvinyl alcohol using Ostwald viscometer and rate of corrosion by weight loss method. (Demo)						8,9	K2	1,2,3,8,9,10	1				
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C106.1	3	2	1	-	-	-	-	1	1	1	-	-	1	-
C106.2	3	2	1	-	-	-	-	1	1	1	-	-	1	-
C106.3	3	2	1	-	-	-	-	1	1	1	-	-	1	-
C106.4	2	1	-	-	-	-	-	1	1	1	-	-	1	-
C106.5	3	2	1	-	-	-	-	1	1	1	-	-	-	-
C106.6	3	2	1	-	-	-	-	1	1	1	-	-	-	-
C106.7	3	2	1	-	-	-	-	1	1	1	-	-	-	-
C106.8	2	1	-	-	-	-	-	-	-	-	-	-	1	-
C106	3	2	1	-	-	-	-	1	1	1	-	-	1	-

20GE1L1

PYTHON PROGRAMMING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To write, test, and debug simple Python programs using conditional statements.
- To implement Python programs using loops.
- To use functions for structuring Python programs.
- To implement Python programs using lists.
- To write Python programs for implementing file operations.

PRE-REQUISITE:NIL

LIST OF PROGRAMS

1. Biggest of three numbers, odd or even number, Leap year.
2. GCD, Armstrong Number, Palindrome, Fibonacci Series, Prime number
3. Find the square root and exponentiation of a number with and without built-in functions
4. Linear search and Binary search using Recursion.
5. Find the maximum of a list of numbers
6. Selection sort, Insertion sort
7. First n prime numbers
8. Transpose of a Matrix
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Merge two files

PLATFORM NEEDED: Python 3 interpreter for Windows/Linux

TOTAL : 60 PERIODS

Course Name :		Course Code:												
CO	Course Outcomes	Exp. No	K-CO	POs	PSOs									
C107.1	Develop simple Python programs using conditional and iterative constructs	1,2,7	K3	1,2,3,5	1,2									
C107.2	Develop simple Python programs using built-in functions and user-defined functions	3	K3	1,2,3,5	1,2									
C107.3	Develop a Python program using recursion to implement linear and binary search	4	K3	1,2,3,5	1,2									
C107.4	Develop a Python program using list to implement selection and insertion sort	5,6	K3	1,2,3,5	1,2									
C107.5	Develop Python programs to implement matrix operations	8,9	K3	1,2,3,5	1,2									
C107.6	Develop a Python program to implement file handling	10,11,12	K3	1,2,3,5	1,2									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C107.1	3	2	1	-	1	-	-	2	2	2	-	2	2	1
C107.2	3	2	1	-	1	-	-	2	2	2	-	2	2	1
C107.3	3	2	1	-	1	-	-	2	2	2	-	2	2	1
C107.4	3	2	1	-	1	-	-	2	2	2	-	2	2	1
C107.5	3	2	1	-	1	-	-	2	2	2	-	2	2	1
C107.6	3	2	1	-	1	-	-	2	2	2	-	2	2	1
C107	3	2	1	-	1	-	-	2	2	2	-	2	2	1

20GE1L2

INDUSTRIAL PRACTICES WORKSHOP

L	T	P	C
0	0	3	1.5

OBJECTIVES:

- To provide exposure to the students with Hands on Experience on various Basic Industrial Practices in Civil, Mechanical, Electrical and Electronics Engineering.

PRE-REQUISITE:NIL

**GROUP A (CIVIL & MECHANICAL)
LIST OF EXPERIMENTS**

I CIVIL ENGINEERING PRACTICE

UNIT-I CARPENTRY PRACTICE

1. Study of carpentry tools.
2. Preparation of Cross lap joint
3. Preparation of Dovetail joint
4. Preparation of T joint

UNIT-II PLUMBING PRACTICE

1. Study of plumbing tools, pipeline joints, its location and functions: valves, taps, couplings, unions, reducers and elbows in household fittings.
2. Exercise on Preparation of plumbing line sketches for water supply and sewage works.
3. Exercise on providing of basic water line connection for a residential house using plumbing components.
4. Exercise on providing Water line pipe connections for household utilities like water heater, wash basin etc.,

II MECHANICAL ENGINEERING PRACTICE

UNIT - III SHEET METAL PRACTICE

1. Study of sheet metal forming tools.
2. Preparation of a Model of rectangular tray.
3. Preparation of a Model of Conical Funnel

UNIT - IV MACHINING PRACTICE

1. Study of machining tools.
2. Exercise on Simple turning, Facing, Chamfering
3. Exercise on Taper turning.
4. Exercise on Drilling and Tapping

UNIT - V METAL JOINING PROCESS

1. Study of welding tools.
2. Exercise to join two metal plates by single butt joint using arc welding.
3. Exercise to join two metal plates by T Fillet joint using arc welding.
4. Exercise to join two metal plates by lap joint using arc welding.

DEMONSTRATION

1. Gas welding process.
2. Refrigeration and Air conditioning process.

GROUP B (ELECTRICAL & ELECTRONICS)		
LIST OF EXPERIMENTS		
I ELECTRICAL ENGINEERING PRACTICE		
1.	Residential house wiring using switches, fuse, indicator, Fluorescent lamp and Energy Meter.	
2.	Measurement of Power consumption for CFL, Fluorescent Lamp, LED Lamp and Incandescent lamp.	
3.	Stair case wiring	
4.	Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.	
5.	Measurement of energy using single phase energy meter.	
6.	Measurement of resistance to earth of an electrical equipment.	
II ELECTRONICS ENGINEERING PRACTICE		
1.	Study of Electronic components – Resistor colour coding, Capacitor, Inductor-Measurement using LCR meter, Transistor & Diode – Terminal identification using Multimeter.	
2.	Study of logic gates AND, OR, EX-OR and NOT.	
3.	Measurement of AC signal parameter (peak-peak, rms value, period & frequency) using CRO and AFO.	
4.	Soldering practice – Components Devices and Circuits – Using general purpose PCB.	
5.	Measurement of ripple factor of HWR and FWR.	
TOTAL : 45 PERIODS		
LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS		
CIVIL		
S. No	Component Name	No. of Components
1	Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, coupling, unions, elbows, plugs and other fittings	15 sets
2	Carpentry Vice (fitted to work bench)	15 nos
3	Standard wood working tools	15 sets
4	Models of industrial trusses, door joints, furniture joints	5 each
5	Power Tools a. Rotary Hammer b. Demolition Hammer c. Circular Saw d. Planer e. Hand Drilling Machine f. Jigsaw	2 nos 2 nos 2 nos 2 nos 2 nos 2 nos
MECHANICAL		
1	Arc welding transformer with cables and holders	5 nos
2	Welding booth with exhaust facility	5 nos

3	Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 sets
4	Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 nos
5	Centre Lathe	2 nos
6	Power Tool: Angle Grinder	2 nos
7	Study purpose items: Refrigerator and Air Conditioner	One each
ELECTRICAL		
1	Assorted electrical components for house wiring	10 sets
2	Electrical measuring instruments	10 sets
3	Study purpose items: Iron box, fan and regulator, emergency lamp	1 each
4	Megger (250V/500V)	1 no.
5	Power Tools a. Range Finder b. Digital Live-wire detector	2 nos 2 nos
ELECTRONICS		
1	Soldering guns	10 nos
2	Assorted electronic components for making circuits	50 nos
3	Small PCBs	10 nos
4	Multimeters	10 nos
5	Regulated of power supply, CRO	1 no. each

Course Name : INDUSTRIAL PRACTICES LABORATORY										Course Code: 20GE1L2				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
C108.1	Prepare different carpentry joints and pipe connections with different joints.										K3	1,2,3,4	-	
C108.2	Make the models using sheet metal.										K3	1,2,3,4	-	
C108.3	Carry out the basic machining operations.										K3	1,2,3,4	-	
C108.4	Prepare arc welded joints using welding equipment										K3	1,2,3,4	-	
C108.5	Demonstrate wiring for a simple residential house; identify the ratings of tube lamp, and calculate the different Electrical quantities										K3	1,2,3,4	-	
C108.6	Measure the electronics equipment using LCR meter, Transistor & Diode – Terminal identification using Multimeter.										K3	1,2,3,4	-	
C108.7	Experimentally to analyze AC signal parameters using CRO and AFO and to verify the Truth tables of Logic gates.										K3	1,2,3,4	-	
C108.8	Experimentally to design a Simple circuit using soldering in a PCB ,measure ripple factor of Half Wave Rectifier and Full Wave Rectifier.										K3	1,2,3,4	-	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C108.1	3	1	1	1	-	-	-	-	-	-	-	-	-	-
C108.2	3	1	1	1	-	-	-	-	-	-	-	-	-	-
C108.3	3	1	1	1	-	-	-	-	-	-	-	-	-	-
C108.4	3	2	1	1	-	-	-	-	-	-	-	-	-	-
C108.5	3	2	1	1	-	-	2	-	2	2	-	-	-	-
C108.6	3	2	1	1	-	-	2	-	2	2	-	-	-	-
C108.7	3	2	1	1	-	-	2	-	2	2	-	-	-	-
C108.8	3	2	1	1	-	-	2	-	2	2	-	-	-	-
C108	3	2	1	1	-	-	2	-	2	2	-	-	-	-

20HS201	ADVANCED TECHNICAL COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- This course is designed for Engineering and Technology curriculum enabling the students to learn, acquire and apply updated elements of English communication.
- The course is aimed at providing effective skills for procuring communication skills for business and advanced technology.
- Students will benefit by learning the four skills – Listening, Speaking, Reading and Writing – to meet the global requirements for their career and higher studies.

PRE-REQUISITE: NIL

UNIT-I TECHNICAL WRITING 9

Listening: Listening to audio-visuals on personal Interviews, Speeches from Company CEOs, TV Debates. **Speaking:** Wishing, Greeting, Enquiring Hobbies. **Reading:** Editorials, Letter to the Editor Columns, Technical Papers. **Writing:** Analytical writings, Emphasis Techniques, Letter Writing – Business Correspondence, Abstract Writing, Common Errors, Footnotes, Compound words, Preparation of Agenda

UNIT-II BUSINESS ENGLISH AND LANGUAGE DEVELOPMENT 9

Listening: Listening to Audio-Visual documentary, TV Programs of Celebrities Forum. **Speaking:** Self-Expression, Introducing the fellow students, Talking about celebrities, leaders
Reading: Company Correspondence, Business Correspondence, Technical Text for Vocabulary
Writing: Bibliography, Sentence Completion, Cloze exercises, Verbal Analogy, Letter – Business enquiry orders, payments, Minutes Preparation.

UNIT - III VISUAL BASED LANGUAGE DEVELOPMENT 9

Listening: Visuals on Group Discussion-Understanding the nuances of GD – Approach – Content – Methodology. **Speaking:** Discussing main points on burning issues, Social issues – Expressing ideas and suggestions. **Reading:** Etiquettes of Non-Verbal Communication. **Writing:** List of common expressions for specified situations – Sentence linkers – Formal Expressions – Suggestions – Reported Speech - Letter to the Editor on Common Issues – Writing the Points in Indirect Form – Check Lists – Numerical Expressions

UNIT - IV EMPLOYABILITY CORRESPONDENCE 9

Listening: Listening to Visuals of Technical Paper presentation – Technical and HR interviews
Speaking: Peer-to-Peer Interview – Mock Interview – Telephone Conversations. **Reading:** Comparative Analyses – Instructions on Public Spots – Time Management concepts – Email Correspondence. **Writing:** Compare and Contrast – Cause and Effect – Purpose and Function – Job Application Letter – Drafting Resume / CV, – Inferring the graphical / Pictorial representations – Bar chart – Pie chart, Instruction – common and technical instructions for a process or a component.

UNIT - V TECHNICAL REPORT WRITING 9

Listening: Key note speeches – Annual Reports of institutions / companies. **Speaking:** Answering to the Mock Panel Interview – Sharing of interview experiences – presenting a Technical Paper. **Reading:** Annual Reports – Company Reports – Newspaper reports – Comprehension passages. **Writing:** Homophones – Abbreviations and Acronyms – SI Units – Report Writing with recommendations – Inferring the Graph – Flow Chart – Tables – Technical Papers

TOTAL: 45 9PERIODS

TEXT BOOKS:

1. Board of editors. **“Fluency in English A Course book for Engineering and Technology”**. Orient Blackswan, Hyderabad: 2016
2. Raman, Meenakshi and Sharma, Sangeetha **“Technical Communication Principles and Practice”**.Oxford University Press: New Delhi,2014.

REFERENCES:

1. Booth-L. Diana, **“Project Work”**, Oxford University Press, Oxford: 2014
2. Grussendorf, Marion, **“English for Presentations”**, Oxford University Press, Oxford: 2007
3. Means, L. Thomas and Elaine Langlois, **“English & Communication For Colleges”**. Cengage Learning, USA: 2007
4. Board of Editor, **“Advanced Technical Communication”**, Great Mind Publication, Chennai : 2019

Course Name : ADVANCED TECHNICAL COMMUNICATION										Course Code: 20HS201				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C109.1	Listen, Understand and create technical correspondence at advanced level.									1-5	-	9,10,12	-	
C109.2	Respond or answer to the contextual questions, interview questions, form instructions, draft reports									1-5	-	9,10,12	-	
C109.3	Speak and analyze social issues, come out with effective ideas for discussion, understand the passages for meaning and vocabulary									1-5	-	9,10,12	-	
C109.4	Assess error free technical writings, create legible and coherent technical papers, derive ideas of the given texts in a precise form									1-5	-	9,10,12	-	
C109.5	Remember the updated elements of communication skills, nuances of non-verbal communication, business communication									1-5	-	9,10,12	-	
C109.6	Create technical instructions, process instructions, self-appraisals, Resumes, reports on various situations									1-5	-	9,10,12	-	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C109.1	-	-	-	-	-	-	-	-	3	3	-	2	-	-
C109.2	-	-	-	-	-	-	-	-	3	3	-	2	-	-
C109.3	-	-	-	-	-	-	-	-	3	3	-	2	-	-
C109.4	-	-	-	-	-	-	-	-	2	3	-	2	-	-
C109.5	-	-	-	-	-	-	-	-	3	3	-	2	-	-
C109.6	-	-	-	-	-	-	-	-	3	3	-	2	-	-
C109	-	-	-	-	-	-	-	-	3	3	-	2	-	-

20BS201	LAPLACE TRANSFORM AND ADVANCED CALCULUS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To make the student familiar with topics such as Multiple Integrals, Vector Calculus, Analytic Functions, Complex Integration and Laplace Transform.
- To learn the concept of basic Vector Calculus which can be widely used for Modeling the various laws of Physics.
- To understand the various methods of Complex Analysis and Laplace Transform can be used for efficiently solving the problems that occur in various branches of Engineering disciplines

PRE-REQUISITE:NIL

UNIT-I LAPLACE TRANSFORM 12
Existence Conditions – Transforms of Elementary Functions – Transform of Unit Step Function and Unit Impulse Function – Basic Properties – Shifting Theorems -Transforms of Derivatives and Integrals – Initial and Final Value Theorems – Inverse Transforms – Convolution Theorem – Transform of Periodic Functions – Application to Solution of Linear Second Order Ordinary Differential Equations with Constant Coefficients.

UNIT-II MULTIPLE INTEGRALS 12
Double integrals – Change of order of integration – Double integrals in Polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of Solids – Change of Variables in Double and Triple integrals.

UNIT - III VECTOR CALCULUS 12
Gradient and Directional Derivative – Divergence and Curl - Vector Identities – Irrotational and Solenoidal Vector fields – Line Integral over a Plane curve – Surface Integral - Area of a Curved Surface - Volume Integral – Green’s, Gauss divergence and Stoke’s theorems – Verification and Application in evaluating Line, Surface and Volume Integrals

UNIT - IV ANALYTIC FUNCTIONS 12
Analytic functions – Necessary and Sufficient Conditions for Analyticity in Cartesian and Polar Coordinates – Properties – Harmonic Conjugates – Construction of Analytic Function – Conformal Mapping – Mapping by Functions $w = z+c$, cz , $1/z$, z^2 -Bilinear transformation.

UNIT - V COMPLEX INTEGRATION 12
Line integral – Cauchy’s Integral Theorem – Cauchy’s Integral Formula – Taylor’s and Laurent’s Series – Singularities – Residues – Residue Theorem – Application of Residue Theorem for Evaluation of Real Integrals – Use of Circular Contour.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 44th Edition, 2017.
2. T. Veerarajan, “Engineering Mathematics I”, The Tata Mc Graw Hill Publication-New Delhi, First Edition 2018.

REFERENCES:

- 1.Kreyszig Erwin, “Advanced Engineering Mathematics”, John Wiley and Sons, 9th Edition, NewDelhi, 2006.
2. James Stewart, “Calculus, Early Transcendental”, Cengage Learning, 7th Edition, New Delhi, 2015.
- 3.Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics II”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 9th Edition, 2014.
- 4.Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics II”,Narosa Publications, New Delhi, 5th Edition, 2016.
- 5.Sastry, S.S. “Engineering Mathematics”, Vol.I& II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.

Course Name : : Laplace Transform and Advanced Calculus										Course Code: 20BS201				
CO	Course Outcomes									Unit No	K-CO	POs	PSOs	
C110.1	Determine the Laplace transform of standard functions using properties									1	K3	1, 2, 3, 8&9	-	
C110.2	Apply Laplace transform and inverse transform to solve the initial value problems									1	K3	1, 2, 3, 8&9	-	
C110.3	Solve the multiple integrals and apply the concept to find areas, volumes									2	K3	1, 2, 3, 8&9	-	
C110.4	Determine the line, surface and volume integrals using Green’s, Gauss and Stokes theorems									3	K3	1, 2, 3, 8&9	1	
C110.5	Determine Analytic functions, Bilinear Transformations and apply the concept of conformal mapping to find the images of given curves.									4	K3	1, 2, 3, 8&9	1	
C110.6	Determine the Contour Integrals using Cauchy’s Integral and Residue theorems.									5	K3	1, 2, 3, 8&9	1	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C110.1	3	2	1	-	-	-	-	1	1	-	-	-	-	-
C110.2	3	2	1	-	-	-	-	1	1	-	-	-	-	-
C110.3	3	2	1	-	-	-	-	1	1	-	-	-	-	-
C110.4	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C110.5	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C110.6	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C110	3	2	1	-	-	-	-	1	1	-	-	-	1	-

20BS204 PHYSICS FOR INFORMATION SCIENCE

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the essential principles of semiconductor device and Electron transport properties.
- To inculcate proficiency in magnetic & optical properties of materials and their fruitful applications.
- To develop knowledge on Nano devices.

PRE-REQUISITE: NIL

UNIT-I ELECTRICAL PROPERTIES OF MATERIALS 9

Classical free electron theory – Derivation of electrical conductivity – Thermal conductivity– Wiedemann-Franz law – Success and failures – electrons in metals – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole

UNIT-II SEMICONDUCTOR PHYSICS 9

Properties of semiconductor – Energy band diagram – direct and indirect band gap semiconductors – Intrinsic Semiconductors – Carrier concentration derivation – electrical conductivity, Energy band gap determination – variation of Fermi level with temperature – extrinsic semiconductors – Carrier concentration in N-type & P-type semiconductors (qualitative) – Variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration – Carrier transport in Semiconductor: random motion, drift, mobility and diffusion – Hall effect and devices.

UNIT - III MAGNETIC PROPERTIES OF MATERIALS 9

Magnetic dipole moment – atomic magnetic moments - magnetic permeability and susceptibility – Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism – antiferromagnetism – ferrimagnetism – Domain Theory of ferromagnetism - M versus H behaviour – Hard and soft magnetic materials – Ferrites and its applications – Magnetic principle in computer data storage – Magnetic hard disc (GMR sensor).

UNIT - IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – carrier generation and recombination processes – Absorption, emission and scattering of light in metals, insulators and semiconductors (concepts only) - photocurrent in a p-n diode – Photo voltaic effect – solar cell and its types – LCD – LED – Organic LED – Laser diodes – Optical data storage techniques.

UNIT - V NANO DEVICES

Quantum structures, Quantum confinement – Density of states in quantum well, quantum wire and quantum dot structure (qualitative) – Band gap of nanomaterials – Size dependence of fermi energy – Coulomb blockade effect –Quantum computation– Introduction– Single electron phenomena and Single Electron Transistor (SET) – Quantum dot laser – Carbon nanotubes: types, Properties and Applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. B.K.Pandey and S.Chaturvedi, "Engineering Physics", Cengage learning, 2013.
2. V.Rajendran, "Engineering Physics", Mc Graw-Hill Education, 2011
3. Charles Kittel, "Introduction to solid state Physics", John Wiley & sons, 8th edition, 2015.

REFERENCES:

1. G.W. Hanson, "Fundamentals of nano electronics", Pearson Education, 2009
2. B. Rogers, Adams and S. Pennathur, "Nanotechnology: Understanding Small Systems", CRC Press, 2019
3. N. Garcia and A. Damask, "Physics for Computer Science Students", Springer Verlag, 2012

Course Name : Physics for Information Science										Course Code: 20BS201				
CO	Course Outcomes									Unit No	K-CO	POs	PSOs	
C111.1	Distinguish classical, quantum electron theories and energy band theory									1	K2	1,2	-	
C111.2	Demonstrate the semiconductors and Hall effect devices									2	K3	1,2,3,8,9,10	-	
C111.3	Explain magnetic properties of materials									3	K2	1,2,8,9,10	-	
C111.4	Explain the optical properties of materials to Opto – electronic applications									4	K2	1,2,8,9,10	-	
C111.5	Summarize the basic operations of p - n junction devices like solar cell, LED etc									4	K2	1,2	1	
C111.6	Discuss different quantum structures, size effect and carbon nanotubes									5	K2	1,2,8,9,10	1	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C111.1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
C111.2	3	2	1	-	-	-	-	1	1	1	-	-	-	-
C111.3	2	1	-	-	-	-	-	1	1	1	-	-	-	-
C111.4	2	1	-	-	-	-	-	1	1	1	-	-	-	-
C111.5	2	1	-	-	-	-	-	-	-	-	-	-	1	-
C111.6	2	1	-	-	-	-	-	1	1	1	-	-	1	-
C111	2	1	-	-	-	-	-	1	1	1	-	-	1	-

20GE201

ENGINEERING GRAPHICS

L	T	P	C
2	0	2	3

OBJECTIVES:

- To develop graphic skills for communication of concepts, ideas and design of engineering products.
- To expose national standards related to technical drawings

PRE-REQUISITE:NIL

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT-I PROJECTION OF POINTS AND LINES 6+6

Orthographic projection – Principles - Principal planes - Projection of points in all quadrants - Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method

UNIT-II PROJECTION OF PLANE SURFACES 6+6

Projection of planes (Polygonal and Circular surfaces) inclined to both the principal planes by rotating object method.

UNIT - III PROJECTION OF SOLIDS 6+6

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

UNIT - IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6+6

Sectioning of simple solids in vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – obtaining true shape of section - Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids, cylinder and cone.

UNIT - V ISOMETRIC PROJECTION AND FREEHAND SKETCHING 6+6

Principles of Isometric Projection – Isometric scale – Isometric projections of simple solids - truncated Prisms and Pyramids.
Visualization concepts and Free Hand sketching: Principles – Representation of Three-Dimensional objects – Layout of views - Freehand sketching of multiple views from pictorial views of objects

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Natarajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 30th Edition, 2017.
2. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 15th Edition, 2018.

REFERENCES:

1. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2019.
2. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson Education, 3rd Edition, 2012.

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: Technical drawings - General principles of presentation.
4. IS 11669 – 1986 :General principles of dimensioning on technical drawings.
5. SP 46 (2003): Engineering Drawing Practice for Colleges.
6. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

SPECIAL POINTS APPLICABLE TO EXAMINATIONS ON ENGINEERING GRAPHICS:

1. 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 making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

Course Name : Engineering Graphics										Course Code: 20GE201				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C114.1	Familiarize with the fundamentals and standards of engineering graphics.										K2	1,2,8	-	
C114.2	Draw the orthographic projections of points and lines.										K3	1,2,3,8	-	
C114.3	Draw the orthographic projections of plane surfaces.										K3	1,2,3,8	-	
C114.4	Draw the projections of simple solids like prisms, pyramids, cylinder and cone.										K3	1,2,3,8	-	
C114.5	Draw the projections of sectional views of solids and develop its lateral surfaces.										K3	1,2,3,8	-	
C114.6	Draw the isometric projection and free hand sketching of simple objects.										K3	1,2,3,8	-	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C114.1	2	1	-	-	-	-	-	1	-	-	-	-	-	-
C114.2	3	2	1	-	-	-	-	1	-	-	-	-	-	-
C114.3	3	2	1	-	-	-	-	1	-	-	-	-	-	-
C114.4	3	2	1	-	-	-	-	1	-	-	-	-	-	-
C114.5	3	2	1	-	-	-	-	1	-	-	-	-	-	-
C114.6	3	2	1	-	-	-	-	1	-	-	-	-	-	-
C114	3	2	1	-	-	-	-	1	-	-	-	-	-	-

20GE205	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Qualitative Treatment only)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamental laws, theorems of electrical circuits and also to analyze them
- To study the basic principles of electrical machines and their performances.
- To study the different energy sources and their utilizations.
- To study the fundamentals of electronic circuits.
- To understand the principles and operations of operational amplifiers.

PRE-REQUISITE: NIL

UNIT-I ELECTRICAL CIRCUITS ANALYSIS 9

Ohms Law, Kirchoff's Law-Instantaneous power- series and parallel circuit analysis with resistive, capacitive and inductive network - nodal analysis, mesh analysis- network theorems - Thevenins theorem, Norton theorem, maximum power transfer theorem and superposition theorem, -star delta conversion

UNIT-II ELECTRICAL MACHINES 9

DC and AC Rotating Machines: Types, Construction, principle, Emf and torque equation, Basics of Stepper Motor- Transformers-Introduction- types and construction, working principle of Ideal transformer-Emf equation- All day efficiency calculation

UNIT - III UTILIZATION OF ELECTRICAL POWER 9

Renewable energy sources-wind and solar panels. Illumination by lamps- Sodium Vapour, Mercury vapour, Fluorescent tube. Domestic refrigerator -Electric circuit, construction and working principle. Protection-need for earthing. Energy Tariff calculation for domestic loads.

UNIT - IV ELECTRONIC CIRCUITS 9

Semi conductors, Types -PN Junction-VI Characteristics of Diode, zener diode, BJT-operations of PNP and NPN transistors- Transistors configurations –Common Base,Common Emitter &Common Collector configurations- Amplifiers

UNIT - V OPERATIONAL AMPLIFIERS AND DIGITAL ELECTRONICS 9

Op amps- Amplifiers, oscillator, rectifiers, differentiator, integrator, ADC, DAC, Number Systems, Complements-1's and 2's Complements- Basic Digital Logic gates, Universal gates- NAND and NOR Implementation

TOTAL: 45 PERIODS

TEXT BOOKS:

1. D.P. Kothari and I.J Nagarath, "Basic Electrical and Electronics Engineering", Mc Graw Hill, 2019, Fourth Edition.
2. M.S. Sukhija and T.K. Nagsarkar, "Basic Electrical and Electronic Engineering", Oxford, 2019.

REFERENCES:

1. S.B. Lal Seksena and Kaustuv Dasgupta, "Fundamentals of Electrical Engineering", Cambridge, 2017

2. B.L Theraja, “Fundamentals of Electrical Engineering and Electronics”. Chand & Co, 2018.
3. S.K.Sahdev, “Basic of Electrical Engineering”, Pearson, 2019.
4. John Bird, “Electrical and Electronic Principles and Technology”, Sixth Edition, Elsevier, 2017.
5. Mittle,Mittal, “Basic Electrical Engineering”, 2nd Edition, Tata McGraw-Hill Edition, 2017.
6. C.L.Wadhwa, “Generation, Distribution and Utilisation of Electrical Energy”, New Age international pvt.ltd.,Revised 4th Edition 2018.

Course Name : Basic Electrical and Electronics Engineering										Course Code: 20EE201				
CO	Course Outcomes										Exp. No	K-CO	POs	PSOs
C112.1	Discuss the essentials of electric circuits and analysis.										1	K2	1, 2, 3, 8&9	-
C112.2	Analyze Electrical circuits and apply various network theorems to solve loop currents and branch voltages.										1	K3	1, 2, 3, 8&9	-
C112.3	Discuss the basic operation of electric machines and transformers.										2	K2	1, 2, 3, 8&9	-
C112.4	Explain the renewable sources and common domestic loads.										3	K2	1, 2, 3, 8&9	-
C112.5	Discuss the basics of semiconductor devices and applications.										4	K2	1, 2, 3, 8&9	-
C112.6	Discuss about applications of Op-amps and basics of digital circuits.										5	K2	1, 2, 3, 8&9	-
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C112.1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
C112.2	3	2	1	-	-	-	-	-	-	-	-	-	-	-
C112.3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
C112.4	2	1	-	-	-	-	-	-	-	-	-	-	-	-
C112.5	2	1	-	-	-	-	-	-	-	-	-	-	-	-
C112.6	2	1	-	-	-	-	-	-	-	-	-	-	-	-
C112	2	1	-	-	-	-	-	-	-	-	-	-	-	-

20CS201

PROGRAMMING IN C

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the basic C programming constructs
- To learn about usage of arrays and strings
- To understand the concepts of functions, pointers, structures and unions
- To expose to file handling operations in C

PRE-REQUISITE:NIL**UNIT-I BASICS OF C PROGRAMMING 9**

Introduction to programming paradigms– Structure of C program– C programming– Data Types, Storage classes, Constants, Enumeration Constants – Keywords, Operators– Precedence and Associativity, Expressions – Input/output statements, Assignment statements –Decision making statements, Switch statement, Looping statements –Pre-processor directives – Compilation process

UNIT-II ARRAYS AND STRINGS 9

Introduction to Arrays– Declaration, Initialization –One dimensional array –Example Program– Computing Mean, Median and Mode, Two dimensional arrays –Example Program– Matrix Operations (Addition, Scaling, Determinant and Transpose), String operations– length, compare, concatenate, copy –Selection sort, linear and binary search

UNIT - III FUNCTIONS AND POINTERS 9

Introduction to functions– Function prototype, function definition, function call, Built- in functions (string functions, math functions), Recursion, Example Program– Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions –Pointers, Pointer operators, Pointer arithmetic, Arrays and pointers – Array of pointers, Example Program - Sorting of names, Parameter passing - pass by value, pass by value, Pass by reference, Example Program– Swapping of two numbers and changing the value of a variable using pass by reference

UNIT - IV STRUCTURES AND UNIONS 9

Structure – Nested structures, Pointer and Structures, Array of structures, Example Program – using structures and pointers, typedef, Self referential structures, Union, Dynamic memory allocation, Illustrative programs – allocating block of memory, sum of n numbers using malloc, calloc.

UNIT - V FILE PROCESSING 9

Files – File operations, Types of file processing– Sequential access, Random access Sequential access file - Example Program– Finding average of numbers stored in sequential access file, Random access file -Example Program– Transaction processing using random access files, Command line arguments

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Balagurusamy, E, "Programming in ANSI C", Eighth Edition, Tata Mcgraw-Hill,2019.

2. Yashavant Kanetkar, "Let Us C", BPB Publications, 17th Edition,2020.
3. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education,2015

REFERENCES:

1. Paul Deitel and Harvey Deitel, "C How to Program", Seventh edition, Pearson Education India, 2015.
2. Juneja, B. L and Anita Seth, "Programming in C", CENGAGE Learning India Pvt. Ltd.,2011
3. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press,2013.
4. Byron Gottfried, "Schaum's outlines- Programming with C", McGraw-Hill Education, Fourth edition, 2018.
5. Reema Thareja, "Programming in C", Oxford University Press, Second Edition,2016.

Course Name : Programming in C										Course Code: 20CS201				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C113.1	Use basic constructs of C programming to develop simple programs.									I	K3	1-3, 8-9, 12	1	
C113.2	Apply one dimensional and two dimensional arrays for implementing matrix operations and string operations.									II	K3	1-3, 8-9, 12	1	
C113.3	Make use of function concept for solving simple mathematical problems.									III	K3	1-3, 8-9, 12	1	
C113.4	Develop programs to implement pointer arithmetic and arrays with pointers.									III	K3	1-3, 8-9, 12	1	
C113.5	Illustrate simple programs for structures and unions and develop real time application programs									IV	K4	1-4, 8-9, 12	1,2	
C113.6	Apply various file operations and develop programs to implement file access procedures.									V	K3	1-3, 8-9, 12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C113.1	3	2	1	-	-	-	-	1	1	2	-	2	3	-
C113.2	3	2	1	-	-	-	-	1	1	2	-	2	3	-
C113.3	3	2	1	-	-	-	-	1	1	2	-	2	3	-
C113.4	3	2	1	-	-	-	-	1	1	2	-	2	3	-
C113.5	3	3	2	1	-	-	-	2	2	2	-	2	3	1
C113.6	3	2	1	-	-	-	-	1	1	2	-	2	3	1
C113	3	2	1	-	-	-	-	1	1	2	-	2	3	1

Course Name : Communication Skills Laboratory									Course Code: 20HS2L1					
CO	Course Outcomes								Exp. No	K-CO	POs	PSOs		
C115.1	Express ideas and concepts on par global communication								1,2	-	9,10,12	-		
C115.2	Involve inter-personal communication with flair and error-free verbatim								3,4	-	9,10,12	-		
C115.3	Face interviews confidently and respond in proper language ability								5,6	-	9,10,12	-		
C115.4	Participate in group discussion and share innovative ideas in technical environments								7,8	-	9,10,12	-		
C115.5	Adapt multi-national exposure on employment								9,10	-	9,10,12	-		
C115.6	Master all-round competency in delivering apt communication for employability								1-10	-	9,10,12	-		
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C115.1	-	-	-	-	-	-	-	-	2	3	-	3	-	-
C115.2	-	-	-	-	-	-	-	-	2	3	-	3	-	-
C115.3	-	-	-	-	-	-	-	-	3	3	-	3	-	-
C115.4	-	-	-	-	-	-	-	-	2	3	-	3	-	-
C115.5	-	-	-	-	-	-	-	-	3	3	-	3	-	-
C115.6	-	-	-	-	-	-	-	-	2	3	-	3	-	-
C115	-	-	-	-	-	-	-	-	2	3	-	3	-	-

20CS2L1

C PROGRAMMING LABORATORY

L	T	P	C
0	0	4	2

- **OBJECTIVES:**

- To develop programs in C using basic constructs.
- To develop applications in C using strings, pointers, functions, structures.
- To develop applications in C using file processing

PRE-REQUISITE:NIL

LIST OF PROGRAMS

1. Programs using I/O statements, expressions and decision-making constructs.
2. Program for finding given year is leap year or not and finding given number is Armstrong number or not.
3. Design a calculator to perform the operations namely, addition, subtraction, multiplication, division and square of a number.
4. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions.
 - 5 if it is a perfect cube.
 - 4 if it is a multiple of 4 and divisible by 6.
 - 3 if it is a prime number.

Sort the numbers based on the weight in the increasing order as shown below <10,its weight>,<36,its weight><89,its weight>
5. Matrix addition and subtraction
6. Matrix multiplication and transpose of a matrix
7. Program using string with and without using string functions: string copy and Reverse the String.
8. Convert the given decimal number into binary, octal and hexadecimal numbers using user defined functions.
9. From a given paragraph perform the following using built-in functions:
 - a. Find the total number of words.
 - b. Capitalize the first word of each sentence.
 - c. Replace a given word with another word.
10. Program using recursion – factorial and Fibonacci series
11. Sort the list of numbers using pass by reference.
12. Generate salary slip of employees using structures and pointers.
13. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.
14. Count the number of account holders whose balance is less than the minimum balance using sequential access file.
15. **Mini project (Any one project: Maximum 4 per Team)**
 - Railway reservation system
 - Library Management System
 - University Result Publication System
 - Hospital Management System
 - Student Automation System
 - Payroll System
 - Banking System
 - Inventory System

PLATFORM NEEDED: Turbo C++ Compiler

TOTAL : 60 PERIODS

Course Name : C Programming Laboratory										Course Code: 20CS2L1				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
C116.1	Develop simple programs using decision making and looping statements.									1-5	K3	1-3, 8-10, 12	1,2	
C116.2	Utilize array concepts to perform matrix addition, subtraction and multiplication.									6-7	K3	1-3, 8-10, 12	1,2	
C116.3	Utilize string operations and develop programs to show string copy and reverse.									8	K3	1-3, 8-10, 12	1,2	
C116.4	Develop programs using user defined functions, built-in functions and recursion.									9-12	K3	1-3, 8-10, 12	1,2	
C116.5	Develop applications using sequential and random access files.									14-15	K3	1-3, 8-10, 12	1,2	
C116.6	Develop simple real time projects using the concepts of structures and union.									13,16	K3	1-3, 8-10, 12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C116.1	3	2	1	-	-	-	-	2	2	1	-	2	3	1
C116.2	3	2	1	-	-	-	-	2	2	1	-	2	3	1
C116.3	3	2	1	-	-	-	-	2	2	1	-	2	3	1
C116.4	3	2	1	-	-	-	-	2	2	1	-	2	3	1
C116.5	3	2	1	-	-	-	-	2	2	1	-	2	3	2
C116.6	3	2	1	-	-	-	-	2	2	1	-	2	3	2
C116	3	2	1	-	-	-	-	2	2	1	-	2	3	2

20BS303

DISCRETE MATHEMATICS

L	T	P	C
3	1	0	4

OBJECTIVES:

- To understand the basic concepts of Logic, Combinatorics and Graph Theory.
- To make the student familiarize the Applications of Algebraic Structures.
- To understand the concepts and significance of Lattices and Boolean algebra which are widely used in Computer Science and Engineering

PRE-REQUISITE:NIL

UNIT-I LOGIC AND PROOFS 12
 Propositional logic – Propositional equivalences - Predicates and Quantifiers – Nested Quantifiers – Rules of Inference - Introduction to Proofs – Proof methods and strategy.

UNIT-II COMBINATORICS 12
 Mathematical Induction – Strong Induction and Well ordering – The basics of Counting -The Pigeon hole Principle – Permutations and Combinations – Recurrence Relations – Solving Linear Recurrence Relations – Generating Functions – Inclusion and Exclusion Principle and its Applications.

UNIT - III REPRESENTATION OF STANDARD GRAPHS 12
 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 12
 Algebraic Systems – Semi Groups and Monoids - Groups – Subgroups – Homomorphism’s – Normal Subgroup and Cosets – Lagrange’s Theorem – Definitions and Examples of Rings and Fields.

UNIT - V LATTICES AND BOOLEAN ALGEBRA 12
 Partial Ordering – Posets – Lattices as Posets – Properties of Lattices - Lattices as Algebraic Systems – Sub Lattices – Direct Product and Homomorphism – Some special Lattices – Boolean Algebra.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Tremblay.J.P. and Manohar.R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Publishing company Limited, New Delhi, 30th Reprint,2008.
2. Veerarajan .T, "Discrete Mathematics with graph theory and combinatorics", Tata McGraw –Hill companies, New Delhi, 4th Reprint,2008.

REFERENCES:

1. Grimaldi. R.P., "Discrete and Combinatorial Mathematics: An Applied Introduction", Pearson Education Asia, Delhi, 5th Edition, 2007.
2. Rosen.K.H., "Discrete Mathematics and its Applications", Tata McGraw Hill Publishing company Limited, New Delhi, 7th Edition, 2011.
3. Koshy.T. "Discrete Mathematics with Applications", Elsevier Publications,2011.

4. Venkatraman.M.K.,Sridharan.V., Chandrasekaran.C., "Discrete Mathematics", National Publishing company, 1st Edition,2001.
5. Tamilarasi. A and Natarajan A.M., "Discrete Mathematics and its Application", Khanna Publishers, 3rd Edition, 2006.

Course Name : Discrete Mathematics										Course Code: 20BS303				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C201.1	Apply the basic formula to formulate the normal forms and Predicate calculus.									1	K3	1, 2, 3, 8&9	1	
C201.2	Solve combinatorial problems using the basic counting techniques									2	K3	1, 2, 3, 8&9	1	
C201.3	Solve recurrence relations using generating functions.									2	K3	1, 2, 3, 8&9	1	
C201.4	Apply the concepts of graph theory in the computer science and technologies field.									3	K3	1, 2, 3, 8&9	1	
C201.5	Apply the concepts and properties of algebraic structures such as groups, rings and fields.									4	K3	1, 2, 3, 8&9	1	
C201.6	Determine the partial ordering, lattices as posets and Boolean algebra using logical relation.									5	K3	1, 2, 3, 8&9	1	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C201.1	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C201.2	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C201.3	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C201.4	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C201.5	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C201.6	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C201	3	2	1	-	-	-	-	1	1	-	-	-	1	-

2. John F. Wakerly, Digital Design Principles and Practices, 5th Edition, Pearson Education, 2018.
3. Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, 6th Edition, CENGAGE Learning, 2013.
4. Donald D. Givone, Digital Principles and Design, Tata McGraw Hill, 2017.

Course Name : Digital Principles and System Design										Course Code: 20CS301				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C202.1	Apply Arithmetic operations in any number system and various techniques to simplify the Boolean function.									I	K3	1-3, 8-9, 12	1	
C202.2	Build combinational circuits that perform arithmetic operations.									II	K3	1-3, 8-9, 12	1	
C202.3	Construct and Analyze Synchronous sequential circuits such as counters and registers.									III	K4	1-3, 8-9, 12	1	
C202.4	Construct and simulate various combinational and sequential circuits using HDL.									III	K3	1-4, 8-9, 12	1	
C202.5	Analyze Asynchronous sequential circuits to find out the impact of Hazards and Races.									IV	K4	1-4, 6, 8-9, 12	1	
C202.6	Model memory arrays for any Boolean function with the help of PLA, PAL and PROM.									V	K3	1-3, 8-9, 12	1	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C202.1	3	2	1	-	-	-	-	1	1	-	-	1	3	-
C202.2	3	2	1	-	-	-	-	1	1	-	-	1	3	-
C202.3	3	3	2	1	-	-	-	1	1	-	-	1	3	-
C202.4	3	2	1	-	-	-	-	1	1	-	-	1	3	-
C202.5	3	3	2	1	-	1	-	1	1	-	-	1	3	-
C202.6	3	2	1	-	-	-	-	1	1	-	-	1	3	-
C202	3	2	1	1	-	1	-	1	1	-	-	1	3	-

20CS302 DATA STRUCTURES AND ALGORITHMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the concepts of ADTs
- To understand the basics of algorithm analysis
- To Learn linear data structures – lists, stacks, and queues
- To apply Tree and Graph structures
- To understand sorting, searching and hashing algorithms and their analysis

PRE-REQUISITE :

Course code : 20CS201

Course Name: Programming in C

UNIT-I INTRODUCTION TO DATA STRUCTURES AND ALGORITHM ANALYSIS 10

Introduction: Data Structures, Notion of an algorithm, Algorithm Efficiency and Analysis Framework, Asymptotic Notations and their properties. Linear Data Structures: Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation — Singly Linked Lists- Circularly Linked Lists- Doubly-Linked Lists – Applications of Lists – Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal). Implementation of algorithmic problems.

UNIT-II LINEAR DATA STRUCTURES – STACKS, QUEUES 8

Stack ADT – Operations – Applications– Evaluating arithmetic expressions- Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue – Priority Queue – deQueue – Applications of Queues

UNIT - III NON LINEAR DATA STRUCTURES – TREES 9

Tree ADT – Tree Traversals – Binary Tree ADT – Expression Trees – Applications of Trees – Binary Search Tree ADT –Threaded Binary Trees- AVL Trees – B-Tree – B+ Tree – Heap – Applications of heap.

UNIT - IV NON LINEAR DATA STRUCTURES – GRAPHS 9

Definition – Representation of Graph – Types of graph – Breadth-first traversal – Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

UNIT - V SEARCHING, SORTING AND HASHING TECHNIQUES 9

Divide and Conquer Methodology: Comparison of Searching Techniques: Linear Search – Binary Search, Mathematical analysis of Binary Search. Sorting – Merge Sort, Quick Sort, Bubble sort – Selection sort – Insertion sort – Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Mark Allen Weiss, — Data Structures and Algorithm Analysis in C, 2nd Edition Reprint, Pearson Education, 2002.
2. ReemaThareja, — Data Structures Using C, Second Edition, Oxford University Press, 2011.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein – Introduction to Algorithms, MIT Press, Third Edition, 2009.

REFERENCES :

1. Stephen G. Kochan, —Programming in C, 3rd edition, Pearson Education, 2005.
2. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, —Fundamentals of Data Structures in C, Second Edition, University Press, 2008.
- 3.

Course Name : DATA STRUCTURES AND ALGORITHMS										Course Code: 20CS302				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C203.1	Explain the concept of asymptotic notations and algorithmic efficiency with properties.									I	K2	1-2, 8-9, 12	1	
C203.2	Describe abstract data types and implement various algorithmic problems using arrays and linked list.									I	K2	1-2, 8-9, 12	1	
C203.3	Apply the different linear data structures like stack and queue to various computing problems.									II	K3	1-3, 8-9, 12	1	
C203.4	Build different types of trees and graphs and apply various operations and their applications.									III, IV	K3	1-3, 8-10, 12	1	
C203.5	Analyze different sorting and searching techniques based on time and space complexity of the algorithms designed using divide and conquer methods.									V	K4	1-4, 8-10, 12	1	
C203.6	Develop suitable hashing algorithm for indexing data items into specific locations in a hash table considering collision resolution techniques.									V	K3	1-3, 8-10, 12	1	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C203.1	2	1	-	-	-	-	-	1	1	-	-	2	2	-
C203.2	2	1	-	-	-	-	-	1	1	-	-	2	3	-
C203.3	3	2	1	-	-	-	-	1	1	-	-	2	3	-
C203.4	3	2	1	-	-	-	-	1	1	1	-	2	3	-
C203.5	3	3	2	1	-	-	-	1	1	1	-	2	3	-
C203.6	3	2	1	-	-	-	-	1	1	1	-	2	3	-
C203	3	2	1	1	-	-	-	1	1	1	-	2	3	-

20EC304	ANALOG AND DIGITAL COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Understand analog & Digital Communication Techniques.
- Learn Data & Pulse modulation Techniques. .
- Be familiarized with source & Error Control Coding.
- Gain Knowledge on multi-user radio communication

PRE-REQUISITE:NIL

UNIT-I ANALOG COMMUNICATION 9

Introduction to Communication Systems - Modulation – Types - Need for Modulation. Theory of Amplitude Modulation - Evolution and Description of SSB Techniques - Theory of Frequency and Phase Modulation – Comparison of Analog Communication Systems (AM – FM – PM).

UNIT-II PULSE AND DATA COMMUNICATION 9

Pulse Communication: Pulse Amplitude Modulation (PAM) – Pulse Time Modulation (PTM) – Pulse code Modulation (PCM) - Comparison of various Pulse Communication System (PAM – PTM – PCM).

Data Communication: History of Data Communication - Standards Organizations for Data Communication- Data Communication Circuits - Data Communication Codes - Data communication Hardware - serial and parallel interfaces.

UNIT - III DIGITAL COMMUNICATION 9

Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK)–Phase Shift Keying (PSK) – BPSK – QPSK – Quadrature Amplitude Modulation (QAM) – 8 QAM – 16 QAM – Bandwidth Efficiency– Comparison of various Digital Communication System (ASK – FSK – PSK – QAM).

UNIT - IV SOURCE AND ERROR CONTROL CODES 9

Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, channel capacity, Error Control Coding, linear block codes, cyclic codes - ARQ Techniques

UNIT - V MULTI-USER RADIO COMMUNICATION 9

Global System for Mobile Communications (GSM) - Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse - Channel Assignment and Handover Techniques - Overview of Multiple Access Schemes - Satellite Communication - Bluetooth.
Case Study: GSM module - Design using Arduino/Raspberry pi

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Wayne Tomasi —Advanced Electronic Communication Systems, 6th Edition, Pearson Education, 2009.
2. Simon Haykin, —Communication SystemsII, 4th Edition, John Wiley & Sons, 2004.

REFERENCES:

1. Rappaport T.S, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2007.
2. J.G.Proakis, M.Salehi, "Fundamentals of Communication Systems", Pearson Education 2014.
3. H.Taub, D L Schilling and G Saha, —Principles of Communication, 3rd Edition, Pearson Education, 2007.
4. B. P.Lathi, —Modern Analog and Digital Communication Systems, 3rd Edition, Oxford University Press, 2007.
5. Blake, —Electronic Communication SystemsII, Thomson Delmar Publications, 2002.
6. Martin S.Roden, —Analog and Digital Communication SystemII, 3rd Edition, Prentice Hall of India, 2002.
7. B.Sklar, —Digital Communication Fundamentals and Applications 2nd Edition Pearson Education 2007.

Course Name : ANALOG & DIGITAL COMMUNICATION										Course Code: 20EC304				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C204.1	Apply different analog modulation schemes in time and frequency domain.									1	K3	PO1,PO2,PO3	PSO1	
C204.2	Illustrate the principle of pulse modulation techniques.									2	K3	PO1,PO2,PO3	PSO1	
C204.3	Illustrate the principle of data communication techniques.									2	K3	PO1,PO2,PO3	PSO1	
C204.4	Make use of performance metric of different digital Modulation schemes.									3	K3	PO1,PO2,PO3	PSO1	
C204.5	Make use of various error control coding techniques to identify/correct errors									4	K3	PO1,PO2,PO3	PSO1	
C204.6	Outline the concepts of Mobile & Satellite Communications									5	K2	PO1,PO2	PSO1	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C204.1	3	2	1	-	-	-	-	-	2	-	-	-	2	-
C204.2	3	2	1	-	-	-	-	-	2	-	-	-	2	-
C204.3	3	2	1	-	-	-	-	-	2	-	-	-	2	-
C204.4	3	2	1	-	-	-	-	-	2	-	-	-	2	-
C204.5	3	2	1	-	-	-	-	-	2	-	-	-	2	-
C204.6	2	1	-	-	-	-	-	-	2	2	-	-	1	-
C204	3	2	1	-	-	-	-	-	2	2	-	-	2	-

20HS301

UNIVERSAL HUMAN VALUES

L	T	P	C
2	1	0	3

OBJECTIVES:

- To create an awareness on Engineering Ethics and Human Values
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

PRE-REQUISITE:NIL**UNIT-I INTRODUCTION TO VALUE EDUCATION 9**

Value Education – Definition - Concept and Need for Value Education - The Evolution of Value Education: Natural acceptance, Self exploration - Fundamentals of value education - Happiness and Prosperity as parts of Value Education- fulfilling human aspirations.

Practice sessions: To discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

UNIT-II HARMONY IN THE HUMAN BEING 9

Human being vs Value education - I' and Body synchronization - Understanding Myself as Co-existence of the Self and the Body - Realization - Self, Body needs - Scanning of Karma -Self and Body- Understanding Sanyam and Health.

Practice sessions: To discuss the role others have played in making material goods available to self. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT - III HARMONY IN THE FAMILY, SOCIETY AND NATURE 9

Family as a basic unit of Human Interaction-Values in Relationships - The Basics for Trust and Respect in today's Crisis: Affection, e-Guidance, Reverence, Glory, Gratitude and Love –Harmony in society : Resolution, Prosperity, Fearlessness and Co-existence as Comprehensive Human Goal- Harmony in Nature: The Four Orders in Nature - The Holistic Perception of Harmony in Existence.

Practice sessions: To discuss on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education. Gratitude as a universal value in relationship. Discuss with scenarios. Elicit examples from students' lives

UNIT - IV SOCIAL ETHICS

The Basics for Ethical Human Conduct - Defects in Ethical Human Conduct - Holistic Alternative and Universal Order - Universal Human Order and Ethical Conduct - Human Rights violation and Social Disparities.

Practice sessions: To discuss human being as cause of imbalance in nature, pollution, depletion of resources and role of technology

UNIT - V PROFESSIONAL ETHICS

9

Value based Life and Profession - Professional Ethics and Right Understanding - Competence in Professional Ethics - Issues in Professional Ethics – The Current Scenario - Vision for Holistic Technologies, Production System and Management Models.

Practice sessions: To discuss the conduct as an engineer or scientist.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. R.R. Gaur, R. Asthana, G.P. Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd revised edition, Excel Books, New Delhi, Reprint 2019.
2. A N Tripathy, Human Values, New Age International Publishers, New Delhi, 2003.

REFERENCES

1. E G Seebauer & Robert L. Berry, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press, 2000.
2. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd, Reprint 2011.
3. Mike Martin and Roland Schinzinger “Ethics in Engineering” McGraw Hill, New York, 4th edition, Reprint 2017.
4. Charles E. Harries, Michael S. Protchard and Michael J. Rabins, “Engineering Ethics-concepts and Cases”, Thomson Learning, 2000.
5. S.K. Chakraborty and Dabangshu Chakraborty, “Human Values and Ethics: Achieving Holistic Excellence”, ICFAI University Press, 2006.

Course Name : Universal Human Values										Course Code: 20HS301				
CO	Course Outcomes										Unit	K-CO	POs	PSOs
C205.1	Explain the significance of value inputs in a classroom and summarize human aspirations.										1	AD	6, 7, 8, 9,10,12	-
C205.2	Distinguish between Values & Skills to ensure happiness and prosperity.										1	AD	6, 7, 8, 9,10,12	-
C205.3	Identify the synchronization between Thyself & the Body to ensure competency of an individual										2	AD	6, 7, 8, 9,10,12	-
C205.4	Generalize the role of a human being in ensuring harmony in society and nature.										3	AD	6, 7, 8, 9,10,12	-
C205.5	Distinguish between ethical and unethical practices and analyze harmonious social environment.										4	AD	6, 7, 8, 9,10,12	-
C205.6	Assess the importance of value based life and evaluate the role of professional ethics.										5	AD	6, 7, 8, 9,10,12	-
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C205.1	-	-	-	-	-	3	2	3	2	2	-	1	-	-
C205.2	-	-	-	-	-	3	2	3	2	2	-	1	-	-
C205.3	-	-	-	-	-	3	2	3	2	2	-	1	-	-
C205.4	-	-	-	-	-	3	2	3	2	2	-	1	-	-
C205.5	-	-	-	-	-	3	2	3	2	2	-	1	-	-
C205.6	-	-	-	-	-	3	2	3	2	2	-	1	-	-
C205	-	-	-	-	-	3	2	3	2	2	-	1	-	-

20CS3L1

DIGITAL SYSTEMS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To understand the various basic logic gates
- To design and implement the various combinational circuits
- To design and implement combinational circuits using MSI devices.
- To design and implement sequential circuits
- To understand and code with HDL programming

PRE-REQUISITE:NIL

LIST OF EXPERIMENTS

1. Verification of Boolean Theorems using basic gates
2. Design and implementation of combinational circuits using basic gates for arbitrary functions.
3. Design and implementation of code converters.
4. Design and implement Half/Full Adder and Subtractor.
5. Design and implement combinational circuits using MSI devices.
 - a. Parity generator /checker
 - b. Magnitude Comparator
 - c. Multiplexers
6. Design and implement shift-registers.
7. Design and implement synchronous counters.
8. Design and implement asynchronous counters.
9. Coding combinational circuits using HDL.
10. Coding sequential circuits using HDL.
11. Design and implementation of a simple real time digital system (Mini Project).

TOTAL : 60 PERIODS

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS HARDWARE:

1. Digital trainer kits -30
2. Digital ICs required for the experiments in sufficient numbers

SOFTWARE: HDL simulator.

Course Name : Digital Systems Laboratory										Course Code: 20CS3L1				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
C206.1	Apply Boolean simplification techniques to construct combinational logic circuits.									1-2	K3	1-3, 8-10, 12	1	
C206.2	Build combinational logic circuits to perform arithmetic operations.									3-4	K3	1-3, 8-10, 12	1	
C206.3	Construct combinational circuits using MSI devices									5	K3	1-3, 8-10, 12	1	
C206.4	Construct Sequential circuits like registers and counters.									6-8	K3	1-3, 8-10, 12	1	
C206.5	Develop combinational and sequential circuits using HDL.									9- 10	K3	1-3, 8-11, 12	1	
C206.6	Develop a simple real time application using Digital system.									11	K3		1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C206.1	3	2	1	-	-	-	-	1	1	1	-	1	3	-
C206.2	3	2	1	-	-	-	-	1	1	1	-	1	3	-
C206.3	3	2	1	-	-	-	-	1	1	1	-	1	3	-
C206.4	3	2	1	-	-	-	-	1	1	1	-	1	3	-
C206.5	3	2	1	-	-	-	-	1	1	1	-	1	3	-
C206.6	3	2	1	-	-	-	-	1	1	1	1	1	3	1
C206	3	2	1	-	-	-	-	1	1	1	1	1	3	1

20CS3L2	DATA STRUCTURES AND ALGORITHMS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- Write functions to implement linear and non-linear data structure operations
- Suggest appropriate linear / non-linear data structure operations for solving a given problem
- Appropriately use the linear / non-linear data structure operations for a given problem
- Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval

PRE-REQUISITE:NIL

LIST OF EXPERIMENTS

1. Implementation of List and Stack Using Array.
2. Implementation of List and Stack Using Linked list.
3. Implementation of Queue Using Linked List.
4. Perform polynomial addition using list.
5. Perform Infix to postfix conversion using stack.
6. Implementation of Binary tree.
7. Implementation of Binary Search tree.
8. Implementation of AVL Tree.
9. Implementation of Heaps using Priority Queues.
10. Implementation of Graph Traversals Using Breadth First Search.
11. Implementation of Graph Traversals Using Depth First Search.
12. Applications of Graph.
13. Case study problem for sorting and searching.
14. Case study problem using linked list.

TOTAL : 60 PERIODS

SOFTWARE: Sublime editor / Turbo C

Course Name : Data Structures And Algorithms Laboratory										Course Code: 20CS3L2				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
C207.1	Develop the array implementation of stack, Queue and List ADTs									1	K3	1-3, 8-10, 12	1	
C207.2	Develop the Linked list implementation of list, Stack and Queue ADTs									2-5	K3	1-3, 8-10, 12	1	
C207.3	Construct Binary trees, Binary search Trees and AVL tree and its operations									6-9	K3	1-3, 8-10, 12	1	
C207.4	Develop various graph traversal algorithms like BFS and DFS.									10-12	K3	1-3, 8-10, 12	1	
C207.5	Analyze the performance of various searching, sorting and hashing algorithms									13	K4	1-4, 8-10, 12	1	
C207.6	Illustrate any real world problem by implement various techniques of Data structures.									13-14	K4	1-4, 8-11, 12	1	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C207.1	3	2	1	-	-	-	-	1	1	1	-	2	3	-
C207.2	3	2	1	-	-	-	-	1	1	1	-	2	3	-
C207.3	3	2	1	-	-	-	-	1	1	1	-	2	3	-
C207.4	3	2	1	-	-	-	-	1	1	1	-	2	3	-
C207.5	3	3	2	1	-	-	-	1	1	1	-	2	3	-
C207.6	3	3	2	1	-	-	-	1	1	1	1	2	3	-
C207	3	2	1	1	-	-	-	1	1	1	1	2	3	-

- d. List all string starts with given letter
6. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
 7. Write a Java program to implement user defined exception handling.
 8. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.
 9. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
 10. Write a java program to find the maximum value from the given type of elements using a generic function.
 11. Design a calculator using event-driven programming paradigm of Java with the following options.
 - a) Decimal manipulations
 - b) Scientific manipulations
 12. Develop a mini project for any application using Java concepts.

TOTAL: 60 PERIODS

SOFTWARE: JDK8.0 / Net beans 11

Course Name : Object Oriented Programming Laboratory										Course Code: 20CS3L3				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
C208.1	Develop and implement Java programs for simple applications using classes and packages.									1-3	K3	1-3, 8-10, 12	1,2	
C208.2	Develop and implement Java programs with inheritance and interfaces.									4-6	K3	1-3, 8-10, 12	1,2	
C208.3	Develop simple java programs for files usage and exceptions handling.									7-8	K3	1-3, 8-10, 12	1,2	
C208.4	Develop simple java programs by implementing multithread concepts and generics.									9	K3	1-3, 5, 8-10, 12	1,2	
C208.5	Develop interactive java application using AWT and Swing.									10-11	K3	1-3, 5, 8-12	1,2	
C208.6	Illustrate any real world problem by implement various OOPs concepts.									12	K4	1-5, 8-12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C208.1	3	2	1	-	-	-	-	1	1	1	-	2	3	1
C208.2	3	2	1	-	-	-	-	1	1	1	-	2	3	1
C208.3	3	2	1	-	-	-	-	1	1	1	-	2	3	1
C208.4	3	2	1	-	1	-	-	1	1	1	-	2	3	1
C208.5	3	2	1	-	1	-	-	1	1	1	1	2	3	1
C208.6	3	3	2	1	1	-	-	1	1	1	1	2	3	1
C208	3	2	1	1	1	-	-	1	1	1	1	2	3	1

20BS403	PROBABILITY, STATISTICS AND QUEUEING THEORY	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
- To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
- To understand the concept of queueing models and significance of advanced queueing models apply in engineering.

PRE-REQUISITE:NIL**UNIT-I PROBABILITY AND RANDOM VARIABLES 12**

Probability - Discrete and continuous random variables – Moments –Moment generating functions – Binomial, Poisson, Uniform, Exponential and Normal distributions.

UNIT-II TWO – DIMENSIONAL RANDOM VARIABLES 12

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression –Transformation of random variables –Central limit theorem (for independent and identically distributed random variables).

UNIT - III RANDOM PROCESSES 12

Classification – Stationary process – Markov process - Poisson process – Discrete parameter Markovchain – Chapman Kolmogorov equations - Limiting distributions

UNIT - IV QUEUEING MODELS 12

Markovian queues – Birth and death processes – Single and multiple server queueing models – Little's formula – Queues with finite waiting rooms–Queues with impatient customers: Balking and reneging.

UNIT - V ADVANCED QUEUEING MODELS 12

Finite source models - M/G/1queue–Pollaczek Khinchin formula-M / D / 1 and M / E_k/ 1 as special cases– Series queues–Open Jackson networks.

TOTAL: 60 PERIODS**TEXT BOOKS:**

1. Ibe.O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, Indian Reprint, 1st Edition, 2010.
2. Trivedi.K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", John Wiley and Sons, 1st Edition, 2002.

REFERENCES:

1. Gross.D.,Shortle, J.F, Thompson, J.M and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student, 4th Edition, 2013.
2. Yates.R.D.andGoodman.D.J., "Probability and Stochastic Processes", Wiley India Pvt. Ltd., Bangalore, 2nd Edition, 2012.
3. Taha.H.A., "Operation Research", Pearson India Education Services, Delhi, 9th

Edition, 2016.

4. Veerarajan.T., "Probability, Statistics and Random Processes", Tata McGraw Hill, NewDelhi, 2006.
5. Gupta.S.C.,Kapoor.V.K., "Fundamental of Mathematical Statistics", Sultanchand& Sons Educational Publishers, NewDelhi, Reprint 2013.

Course Name : PROBABILITY , STATISTICS AND QUEUEING THEORY										Course Code: 20BS403				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C209.1	Build the parameters of statistical distributions using basic probability theory concepts .									1	K3	1, 2, 3, 8&9	-	
C209.2	Calculate the statistical measures for two dimensional random variables.									2	K3	1, 2, 3, 8&9	1	
C209.3	Apply the concepts of correlation and regression for two dimensional random variables.									2	K3	1, 2, 3, 8&9	1	
C209.4	Apply the concept of random processes in engineering disciplines.									3	K3	1, 2, 3, 8&9	1	
C209.5	Solve queueing models using finite and infinite server model.									4	K3	1, 2, 3, 8&9	1	
C209.6	Solve advanced queueing models using open network.									5	K3	1, 2, 3, 8&9	1	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C209.1	3	2	1	-	-	-	-	1	1	-	-	-	-	-
C209.2	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C209.3	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C209.4	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C209.5	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C209.6	3	2	1	-	-	-	-	1	1	-	-	-	1	-
C209	3	2	1	-	-	-	-	1	1	-	-	-	1	-

20CS401	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamentals of a computer system and operations.
- To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
- To learn the basics of pipelined execution.
- To understand parallelism and multi-core processors.
- To understand the memory hierarchies and different ways of communication with I/O devices.

PRE-REQUISITE:

Course code: 20CS301
 Course Name: Digital Principles and System Design

UNIT-I FUNDAMENTALS OF A COMPUTER SYSTEM 9
 Functional Units – Basic Operational Concepts- Bus structures – Performance Metrics – Instructions: Language of the Computer – Operations, Operands – Instruction Set Architecture- Instruction representation- RISC and CISC Architectures – Amdahl’s Law – Logical operations – decision making – MIPS Addressing

UNIT-II ARITHMETIC FOR COMPUTERS 9
 ALU design -Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism

UNIT - III PROCESSOR AND CONTROL UNIT 9
 Components of the Processor - Hardwired control – Micro programmed control – Nano programming-A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined data path and control – Hazards – Structural, Data and Control Hazards –Exception handling. Building blocks of Raspberry-pi

UNIT - IV PARALLELISIM 9
 Parallel processing challenges – Instruction Level Parallelism - Exploitation of more ILP – Hardware and Software Approaches – Dynamic Scheduling – Speculation – Compiler Approaches – Multiple Issue Processors - ILP and Thread Level Parallelism-Flynn’s classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

UNIT - V MEMORY & I/O SYSTEMS 9
 Memory Hierarchy - memory technologies – cache memory – measuring and improving cache performance – virtual memory- Memory management techniques – Associative memories - TLB’s – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits - USB.Case Study: Design of Memory Systems using Raspberry Pi.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, 5th Edition, Morgan Kaufmann / Elsevier, 2014.
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky and NaraigManjikian, Computer Organization and Embedded Systems, 6th Edition, Tata McGraw Hill, 2012.

REFERENCES:

1. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, 5th Edition, 2012.
2. John P. Hayes, Computer Architecture and Organization, 3rd Edition, Tata McGraw Hill, 2012.
3. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.
4. Learning Computer Architecture using Raspberry pi – EbenUpton, Jeffrey Duntemann 2016 (1st Edition).

Course Name : Computer Organization And Architecture		Course Code: 20CS401												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
C210.1	Explain the computer organization components, instructions and addressing modes.	I	K2	1-2	1									
C210.2	Compute the arithmetic operations such as Addition, Subtraction, Multiplication and Division.	II	K3	1-3, 8-9	1									
C210.3	Discuss the basics of MIPS implementation and pipelining.	III	K2	1-2, 8-10, 12	1									
C210.4	Illustrate the basic concepts of parallelism, multi-core processor, GPU & Clusters.	IV	K2	1-2, 8-9, 12	1									
C210.5	Describe the memory technologies & I/O systems.	V	K2	1-2, 8-10, 12	1									
C210.6	Utilize Raspberry-pi for demonstrating memory systems.	V	K3	1-3, 5, 8-9, 12	1,2									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C210.1	2	1	-	-	-	-	-	-	-	-	-	-	2	-
C210.2	3	2	1	-	-	-	-	1	1	-	-	-	3	-
C210.3	2	1	-	-	-	-	-	1	1	1	-	1	2	-
C210.4	2	1	-	-	-	-	-	1	1	-	-	1	2	-
C210.5	2	1	-	-	-	-	-	1	1	1	-	1	2	-
C210.6	3	2	1	-	1	-	-	1	1	-	-	1	2	1
C210	3	2	1	-	1	-	-	1	1	1	-	1	2	1

20CS402

DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the fundamentals of data models and to depict a database system using ER diagrams.
- To study relational database and to write SQL queries to store/retrieve data to/from database.
- To understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures for real time applications.
- To understand working procedures of query processing and query optimization techniques.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To study concepts of advanced databases.

PRE-REQUISITE:

Course Code: 20CS302

Course Name: Data Structures and Algorithms

UNIT-I DATABASE FUNDAMENTALS**8**

Purpose of Database System – Views of data – Database System Architecture – Introduction to Data Models – Network model – Hierarchical Model – Introduction to Relational Model – Constraints – keys – Entity Relationship Model – Entity Sets – Attributes - Extended E-R features – ER reduction to Relational Schemas

UNIT-II RELATIONAL AND ADVNACED DATABASE**10**

Structure of Relational Database – Relational Query Language – Relational Algebra – SQL Fundamentals – Basic Queries – Set Operations – Aggregate Functions – Clauses – Subqueries – Correlated Subqueries – Joins – Views – Authorization – Advanced SQL – Triggers – Cursors – Procedure – Functions – Embedded SQL – Dynamic SQL – Types of advanced Databases – Distributed Database and Object Oriented Database Architectures - XML Databases: XML Hierarchical Model, DTD, XML Schema, X-Query - Introduction to NoSQL.

UNIT - III DATABASE DESIGN**9**

Need for Database Design – Functional Dependencies – Closure of Functional Dependencies – Attribute Closure – Dependency Preservation – Decomposition – Canonical Cover – First Normal Form – Second Normal Form – Third Normal Form – Boyce Code Normal Form – Multivalued Dependencies - Fourth Normal Form – Join Dependencies – Fifth Normal Form.

UNIT - IV TRANSACTIONS**9**

Transaction Concepts – ACID properties – Transaction States – Serializability – Conflict Serializability – View Serializability – Concurrency Control – Lock Based Protocols – Deadlocks – Time Based Protocols – Stamp Based Protocols – Validation Based Protocols – Recovery System – Failure Classifications – Storage – Recovery and Atomicity – Recovery Algorithms.

UNIT - V STORAGE AND QUERY PROCESSING 9

RAID – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation.

TOTAL: 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

1. C.J.Date, A.Kannan, S.Swamynathan, —An Introduction to Database SystemsII, 8th Edition, Pearson Education, 2006.
2. Raghu Ramakrishnan, —Database Management SystemsII, 4th Edition, McGraw-Hill College Publications, 2015.
3. G.K.Gupta,"Database Management SystemsII, Tata McGraw Hill, 2011O G Palanna, "Engineering Chemistry", McGraw Hill Education (India) PVT, LTD, Chennai, 2017.

Course Name : Database Management Systems										Course Code: 20CS402				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C211.1	Compare File Processing System with Database and summarize the basic concepts of Database, various Data Models and Database System Architecture.									I	K2	1-2, 12	1,2	
C211.2	Identify Entities, Attributes and their Relationships to prepare ER diagram for real time applications.									I	K3	1-3, 8-9, 12	1	
C211.3	Transfer an information model into a relational database schema and use DDL, DML, DQL, DCL, TCL and advanced concepts of SQL to implement the schema.									II	K3	1-3, 5, 8-10, 12	1	
C211.4	Develop simple database using XML and relate advanced databases with relational model.									II	K3	1-3, 8-10, 12	1,2	
C211.5	Construct a database by identifying dependencies and optimize it with suitable normal forms to reduce redundancy.									III	K3	1-3, 8-10, 12	1,2	
C211.6	Compare real time applications with respect to transaction, concurrency control, and data object locking protocols and select appropriate storage and recovery techniques.									IV	K4	1-5, 8-9, 12	1,2	
C211.7	Identify the purpose of query processing and query optimization techniques and also demonstrate the query evaluation for given query.									V	K3	1-3, 5, 8-9, 12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C211.1	2	1	-	-	-	-	-	-	-	-	-	1	3	1
C211.2	3	2	1	-	-	-	-	1	1	-	-	1	3	-
C211.3	3	2	1	-	1	-	-	1	1	1	-	1	3	-
C211.4	3	2	1	-	-	-	-	1	1	1	-	1	3	1
C211.5	3	2	1	-	-	-	-	1	1	1	-	1	3	1
C211.6	3	3	2	1	1	-	-	1	1	-	-	1	3	1
C211.7	3	2	1	-	1	-	-	1	1	-	-	1	3	1
C211	3	2	1	1	1	-	-	1	1	1	-	1	3	1

20CS403	DESIGN AND ANALYSIS OF PARALLEL ALGORITHMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To choose appropriate sequential algorithm design techniques for solving problems.
- To understand different parallel architectures and models of computation.
- To apply parallel algorithms for basic problems.
- To analyze the various classes of parallel algorithms.

PRE-REQUISITE:

Course Code: 20CS302

Course Name: Data Structures and Algorithms

UNIT-I GREEDY TECHNIQUES 9

General Method – Knapsack Problem – Job Sequencing with Deadlines - Minimum Cost Spanning Trees – Prim’s Algorithm, Kuruskal’s Algorithm – Optimal Merge Pattern - Single Source Shortest Paths.

UNIT-II DYNAMIC PROGRAMMING TECHNIQUES 9

General Method – Multistage Graph – All pair shortest path – Optimal Binary Search Tree- 0/1 Knapsack Problem -Travelling Salesman Problem - Flow Shop Scheduling

UNIT - III BACKTRACKING AND BRANCH & BOUND TECHNIQUES 9

Backtracking Techniques: General Method – The 8 Queen’s problem – Sum of Subset – Hamiltonian Cycles – Knapsack Problems
Branch & Bound Techniques: Least Cost Search – 0/1 Knapsack Problem -Travelling Salesman Problem - Assignment problem.

UNIT - IV PARALLEL ALGORITHMS 9

Introduction to parallel Algorithms – Computational Model – Fundamentals Techniques and Models: Prefix Computation – List Ranking – Selection – Merging – Sorting – Graph Problems.

UNIT - V SIMD AND MIMD ALGORITHMS 9

2D Mesh SIMD Model – Parallel Algorithms for Reduction – Prefix Computation – Selection - Odd-Even Merge Sorting – UMA Multiprocessor Model - Matrix Multiplication on Multiprocessors and Multicomputer.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Ellis Horowitz, SartajSahni and Sanguthevar Rajasekaran, “Fundamentals of Computer Algorithms”, University press, 2nd edition, 2011.
2. Michael J. Quinn, “Parallel Computing: Theory & Practice”, Tata McGraw Hill Edition, 2nd edition, 2017.

REFERENCES:

1. AnanyLevitin, —Introduction to the Design and Analysis of Algorithms, 3rd Edition, Pearson Education, 2012.
2. AnanthGrame, George Karpis, Vipin Kumar and Anshul Gupta, “Introduction to

Parallel Computing”, 2nd Edition, Addison Wesley, 2003.

3. S.G.Akl, “The Design and Analysis of Parallel Algorithms”, PHI, 1989.

Course Name : Design And Analysis Of Parallel Algorithms										Course Code: 20CS403				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C212.1	Apply greedy techniques to solve various optimization problems like Knapsack problem and minimum cost spanning tree.									I	K3	1-3, 8-9, 12	1	
C212.2	Make use of dynamic programming approach to solve various optimization problems like multistage graph and travelling salesman problems.									II	K3	1-3, 8-9, 12	1	
C212.3	Solve and analyze the performance of problems by Backtracking and Branch & Bound design techniques.									III	K4	1-3, 8-9, 12	1	
C212.4	Explain the fundamental techniques and models of parallel algorithms.									IV	K2	1-2	1	
C212.5	Apply SIMD parallel algorithms in computation problems like selection and sorting.									V	K3	1-3, 8-9, 12	1	
C212.6	Utilize multiprocessors and multicomputer models to solve matrix multiplication.									V	K3	1-3, 8-9, 12	1	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C212.1	3	2	1	-	-	-	-	1	1	-	-	1	3	-
C212.2	3	2	1	-	-	-	-	1	1	-	-	1	3	-
C212.3	3	3	2	1	-	-	-	1	1	-	-	1	3	-
C212.4	2	1	-	-	-	-	-	-	-	-	-	-	3	-
C212.5	3	2	1	-	-	-	-	1	1	1	-	1	3	-
C212.6	3	2	1	-	-	-	-	1	1	1	-	1	3	-
C212	3	2	1	-	-	-	-	1	1	1	-	1	3	-

20HS401	ENVIRONMENTAL SCIENCE AND ENGINEERING	L	T	P	C
		2	0	0	2

OBJECTIVES:

- To study the scope and significance of environment
- To understand the interrelationship between living organism and environment
- To get a conceptual knowledge on various types of pollution and its effects
- To gain knowledge on various natural resources and its significances
- To provide knowledge on solid wastes, disposal methods and natural disasters and its management
- To learn social issues such as human welfare, sustainability related to population

PRE-REQUISITE:NIL**UNIT-I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 6**

Environment – definition, importance, public awareness

Ecosystem – concept, structure and function– producers, consumers and decomposers - characteristic features, structure and function of the forest ecosystem and grassland ecosystem

Biodiversity– definition, types - genetic, species and ecosystem diversity – values - consumptive use, productive use, social, ethical, aesthetic and option values – hot-spots of biodiversity –threats to biodiversity: habitat loss, poaching of wildlife – endangered and endemic species of India. Assignment on Conservation of biodiversity.

UNIT-II ENVIRONMENTAL POLLUTION 6

Definition, causes, effects and control measures of (i) Air pollution (ii) Water pollution (iii) Soil pollution (iv) Marine pollution – role of an individual in prevention of pollution – pollution case studies - Climate change - global warming, acid rain, ozone layer depletion

UNIT - III NATURAL RESOURCES 6

Forest resources: Uses, over-exploitation, deforestation, case studies

Water resources: Surface water and ground water - uses, over-utilization, conflicts over water, Conservation of water - rain water harvesting, dams-benefits and problems

Mineral resources: uses, over exploitation, environmental effects of extracting mineral resources, case studies.

UNIT - IV SOLID WASTE AND DISASTER MANAGEMENT 6

Solid waste management: Introduction, types, effects on human beings and disposal management.

Disaster management: Introduction, causes, effects and management of flood, cyclone, earthquake, landslide disasters, case studies– roles and responsibilities of Government and community.

UNIT - V HUMAN POPULATION AND SOCIAL ISSUES 6

Population growth, population explosion – family welfare programme – women and child welfare – human rights – value education – sustainable development – resettlement and rehabilitation – waste land reclamation – role of information technology in environment and human health. Debate on women and child welfare.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. AnubhaKaushik and Kaushik C.P., Environmental Science and Engineering, New AgeInternational (P) Ltd, Sixth Edition, 2018.
2. Benny Joseph, Environmental Science and Engineering, Tata McGraw-Hill Publishing Company Ltd, New Delhi, ISBN: 0070601690, 2006

REFERENCES:

1. ErachBharucha, "Text book of Environmental Studies", Universities Press (I) PVT LTD, Hyderabad, 2015.
2. G. Tyler Miller and Scott E.Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.
3. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2nd edition, Pearson Education, 2004

Course Name : Environmental Science and Engineering		Course Code: 20HS401												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
C213.1	Describe the environment, ecosystem and their significances.	I	K2	6,7	-									
C213.2	Explain the threats to biodiversity.	I	K2	6,7	-									
C213.3	Describe the sources, effects, control methods of environmental pollution.	II	K2	6,7	-									
C213.4	Explain the knowledge on various natural resources and its effect on environment due to over utilization.	III	K2	6,7	-									
C213.5	Describe the disposal techniques of solid waste and record the consequences of natural disasters.	IV	K2	6,7	-									
C213.6	Outline the social issues as welfare, sustainability etc., and relate with population growth.	V	K2	6,7	-									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C213.1	-	-	-	-	-	2	3	-	-	-	-	-	-	-
C213.2	-	-	-	-	-	2	3	-	-	-	-	-	-	-
C213.3	-	-	-	-	-	2	3	-	-	-	-	-	-	-
C213.4	-	-	-	-	-	2	3	-	-	-	-	-	-	-
C213.5	-	-	-	-	-	2	3	-	-	-	-	-	-	-
C213.6	-	-	-	-	-	2	3	-	-	-	-	-	-	-
C213	-	-	-	-	-	2	3	-	-	-	-	-	-	-

20CS404

OPERATING SYSTEMS

L	T	P	C
3	0	2	4

OBJECTIVES:

- To understand the basic concepts and functions of operating systems.
- To understand Processes and Threads
- To analyze Scheduling algorithms.
- To understand the concept of Deadlocks.
- To analyze various memory management schemes.
- To understand I/O management and File systems.
- To study various operating systems like Distributed OS, Real-Time OS and basic concepts of virtualization

PRE-REQUISITE:NIL

UNIT-I OPERATING SYSTEM OVERVIEW 9

Operating system overview-objectives and functions, Evolution of Operating System, Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot. Processes - Process Concept, Process Scheduling, Operations on Processes, Inter Process Communication.

LAB COMPONENT 6

1. Basic Linux Commands and Overview
2. Write Shell Script to experiment with system calls like fork, grep, pipe, open, create read, write, etc.

UNIT-II PROCESS MANAGEMENT AND CONCURRENCY CONTROL 9

CPU Scheduling - Scheduling criteria, Scheduling algorithms; Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Semaphores, Classic problems of synchronization, Monitors; Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

LAB COMPONENT 6

1. Implementation of FCFS, SJF, Round Robin, Priority Scheduling Algorithms and analyzing their performance
2. Implement semaphore for solving producer-consumer problem using threads.
3. Simulate situations for testing Deadlock avoidance algorithm.

UNIT - III STORAGE MANAGEMENT 9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory.

LAB COMPONENT 6

1. Implementation Of FIFO, LRU, Optimal Page Replacement Algorithms

UNIT - IV MASS STORAGE AND FILE SYSTEMS 9

Mass Storage system – Disk Structure, Disk Scheduling and Management; File-System- File concept, Access methods, File Sharing and Protection, Allocation Methods, Free Space Management; Directory- Structure, organization, implementation

LAB COMPONENT

6

1. Implementation of Directory organizations like – single, two-level, hierarchy
2. Implementation of Allocation methods used for files like – sequential, indexed, linked

UNIT - V ADVANCED OPERATING SYSTEMS AND VIRTUALIZATION

9

Basics of Network Operating System, Server Operating System, Real Time Operating System and Distributed operating systems - Virtual machines- supporting multiple operating systems simultaneously on a single hardware platform; running one operating system on top of another

LAB COMPONENT

6

1. Case Study to Learn Virtualization platforms – VM Ware, etc.
2. Installation of Raspbian OS in Raspberry pi
3. Simple C programs to execute OS services using Raspberry pi.

TOTAL: 75 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, — Operating System Concepts, 10th Edition, John Wiley and Sons Inc., 2018.
2. William Stallings, “Operating Systems – Internals and Design Principles”, 7th Edition, Prentice Hall, 2011.

REFERENCES:

1. RamazElmasri, A. Gil Carrick, David Levine, — Operating Systems – A Spiral Approach, Tata McGraw Hill Edition, 2010.
2. AchyutS.Godbole, AtulKahate, — Operating Systemsll, McGraw Hill Education, 2016.
3. Andrew S. Tanenbaum, “Modern Operating Systems”, Fourth Edition, Pearson Publications, 2014.

Course Name : Operating Systems		Course Code: 20CS404													
CO	Course Outcomes	Unit	K-CO	POs	PSOs										
C214.1	Apply the basic functions of Operating System and Process communications.	I	K3	1-3, 8-10, 12	1										
C214.2	Analyze the performance of CPU scheduling algorithms specifically FCFS, SJF, Priority and Round Robin.	II	K4	1-4, 8-10, 12	1										
C214.3	Apply various process synchronization methods and deadlock avoidance algorithm for a given scenario.	II	K3	1-3, 8-10, 12	1										
C214.4	Develop memory management schemes using paging and segmentation	III	K3	1-3, 8-10, 12	1										
C214.5	Demonstrate various file allocation methods and directory structures.	IV	K3	1-3, 8-10, 12	1										
C214.6	Classify different operating systems based on application requirements.	V	K3	1-3, 8-10, 12	1										
C214.7	Make use of virtualization platform to build virtual machines	V	K3	1-6, 8-10, 12	1										
CO-PO Mapping															
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
C214.1	3	2	1	-	-	-	-	1	1	1	-	1	3	-	
C214.2	3	3	2	1	-	-	-	1	1	1	-	1	3	-	
C214.3	3	2	1	-	-	-	-	1	1	1	-	1	3	-	
C214.4	3	2	1	-	-	-	-	1	1	1	-	1	3	-	
C214.5	3	2	1	-	-	-	-	1	1	1	-	1	3	-	
C214.6	3	2	1	-	-	-	-	1	1	1	-	1	3	-	
C214.7	3	2	1	-	1	1	-	1	1	1	-	1	3	-	
C214	3	2	1	1	1	1	-	1	1	1	-	1	3	-	

20CS4L1	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To write and debug Database commands.
- To implement advanced query in Database tool.
- To use functions and procedures for implementing simple logics in Database.
- To design real time applications using front end tool and Database.
- To implement Database connectivity for real time application.

PRE-REQUISITE:NIL

LIST OF PROGRAMS

1. Data Definition and Data Manipulation Language Commands.
2. Data Control and Transaction Control Language Commands.
3. Aggregate Functions and Set Operations.
4. Nested Subqueries and Join Queries.
5. Views, Indexes and Synonyms.
6. Study of PL/SQL programs
7. PL/SQL - procedures
8. PL/SQL - Functions
9. PL/SQL - Triggers
10. PL/SQL - Cursor
11. Front end application development – Create Forms, Menu and Reports.
12. Implementation of Database Connectivity

PLATFORM NEEDED: Oracle/Mysql/Visual Basics/Netbeans IDE

TOTAL: 60 PERIODS

Course Name : Database Management Systems Laboratory										Course Code: 20CS4L1				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
C215.1	Develop simple Database using DDL, DML and TCL commands.									1,2	K3	1-3, 8-10, 12	1,2	
C215.2	Construct a Relational Database for real time application through Database constraints.									3	K3	1-3, 8-10, 12	1,2	
C215.3	Make use of subqueries and join queries to derive and execute complex queries.									4-5	K3	1-3, 8-10, 12	1,2	
C215.4	Develop PL/SQL programs to implement simple logics using Stored Procedure, Functions, Triggers and Cursor.									6-10	K3	1-3, 8-10, 12	1,2	
C215.5	Develop a frontend application to display forms, menu and reports.									11	K3	1-3, 5, 8-10, 12	1,2	
C215.6	Model real time applications with Database Connectivity.									12	K3	1-3, 5, 8-10, 12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C215.1	3	2	1	-	-	-	-	1	1	1	-	1	3	1
C215.2	3	2	1	-	-	-	-	1	1	1	-	1	3	1
C215.3	3	2	1	-	-	-	-	1	1	1	-	1	3	1
C215.4	3	2	1	-	-	-	-	1	1	1	-	1	3	1
C215.5	3	2	1	-	1	-	-	1	1	1	-	1	3	2
C215.6	3	2	1	-	1	-	-	1	1	1	-	1	3	2
C215	3	2	1	-	1	-	-	1	1	1	-	1	3	1

20HS4L2	PROFESSIONAL COMMUNICATION LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- This course is framed for imparting practical approach in learning and enhancing communication skill among engineering students.
- Students will be able to identify appropriate expressions in speaking and writing.
- Students will also be able to understand this style and perfection of language in reading and listening various contexts of engineering and technology.
- The course will benefit to the students to gain confidence for every day communication, technical presentation, aptitude test and interviews

PRE-REQUISITE:NIL

UNIT-I LISTENING 6
Listen And Take Notes of Lecture, Talks on Engineering and Technology, Developing effective listening skills, Barriers to Effective listening, Listening Self-Introduction Videos

UNIT-II SPEAKING 6
Self-Introduction, Introduce oneself to the audience, Sharing memorable incidents, Individual presentation practice, Introduction to Group Discussion, GD strategies- activities to improve GD skills

UNIT - III READING 6
Reading Online Blogs, Reading Advertisement in Online, Newspaper archives to reading, Reading FAQ's related to job Interview, General awareness of current affairs.

UNIT - IV WRITING 6
Process Description, Narrating experience, Creating Email blogs, Review Writing – Books, Movies And Journals, Job Application Letter, Resume Writing.

UNIT - V SUMMARIZING ACTIVITIES 6
Reading -cloze exercise, Identifying redundant words, Jargon words, Foreign words, Technical terms Writing- Error free sentence, Essay writing on various levels – basic, middle and advanced, Preparing job application letter and Resume Speaking -Face to face conversation on specific topics, Answering Interview Questions, Panel Interview, Participating in Group Discussion, Technical Presentation

TOTAL: 30 PERIODS

TEXT BOOKS:

1. E.Sureshkumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015.

REFERENCES:

1. Butterfield, Jeff Soft Skills of Everyone, Cengage Learning: New Delhi,2015.
2. Interact English Lab Manual For Undergraduate Students, Orient BlackSwan: Hyderabad, 2016.
3. Raman, Meenakshi and Sangeetha Sharma. Professional Communication. Oxford university press: Oxford,2014.
4. Hariharaneta. Soft Skills. MJP Publishers : Chennai,2010.

Course Name : Professional Communication Laboratory										Course Code: 20HS4L2				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
C216.1	Listen and Respond global English appropriately									1,2		9,10,12	-	
C216.2	Participate in group discussions towards placement drive									3,4		9,10,12	-	
C216.3	Make effective presentations of technical topics									5,6		9,10,12	-	
C216.4	Communicate with effective technological skills									7,8		9,10,12	-	
C216.5	Read and Write the context cohesively and coherently and organize ideas logically in workplace situations									9,10		9,10,12	-	
C216.6	Attend job interviews and be successful in them									1-10		9,10,12	-	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C216.1	-	-	-	-	-	-	-	-	2	3	-	3	-	-
C216.2	-	-	-	-	-	-	-	-	2	3	-	3	-	-
C216.3	-	-	-	-	-	-	-	-	3	3	-	3	-	-
C216.4	-	-	-	-	-	-	-	-	2	3	-	3	-	-
C216.5	-	-	-	-	-	-	-	-	3	3	-	3	-	-
C216.6	-	-	-	-	-	-	-	-	2	3	-	3	-	-
C216	-	-	-	-	-	-	-	-	2	3	-	3	-	-

20CS501

COMPUTER NETWORKS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the concept of layering and functions of each layers of the protocol suits
- To be familiar with the components required to build different types of networks
- To learn concepts related to network addressing and routing
- To familiarize the functions and protocols of the layer of Transport layer
- To understand the working of various application layer protocols

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION TO NETWORKS 8

Network Introduction: Evolution of Computer Networks, Classification of computer Networks LAN, WAN, MAN, Software Defined Networks (SDN), Network Topology: BUS, STAR, RING, MESH, OSI Layered Architecture, TCP/IP Protocol Suite

UNIT-II MEDIA ACCESS & INTER NETWORKING 12

Medium Access Control Techniques: Random, Round Robin, Reservation: ALOHA Pure and Slotted, CSMA/CD-CSMA/CA- Ethernet-Token Ring-Token Bus-ARQ 3 Types, Data Link Layer design issues: Error Detection Codes, Parity Check, Checksum Error Correction Codes, Hamming codes, IEEE Standards: Bluetooth (802.15), Basic Internetworking: IP - CIDR-ARP -DHCP -ICMP.

UNIT - III NETWORK DEVICES AND NETWORK LAYER 8

Network Devices: Router, Switch, HUB, Bridge, Routing: Static Routing, Introduction to dynamic Routing, Categories of Routing – RIP v1 and RIP v2-OSPF-DSDV,IPV6 Addressing-IPV6 Protocol.

UNIT - IV TRANSPORT LAYER 9

Overview of Transport layer: UDP - Reliable byte stream (TCP), Connection Management: Flow control – Retransmission – TCP Congestion control, Congestion avoidance: DECbit - RED.

UNIT - V APPLICATION LAYER 8

Traditional applications: SSH – HTTP – FTP –DNS – SNMP- Telnet

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.

REFERENCES:

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An

- OpenSource Approach, McGraw Hill Publisher, 2011.
 4. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

Course Name : Computer Networks		Course Code: 20CS501												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
C301.1	Explain the organization of computer networks with the concept of layered approach	1	K2	1,2,12	1									
C301.2	Classify various Media Access Control Protocols techniques	2	K3	1,2,3,8,9,12	1									
C301.3	Apply the error detection and error correction methods for bit streams	2	K3	1,2,3,8,9,12	1									
C301.4	Utilize various types of routing techniques to forward packets	3	K3	1,2,3,8,9,10,12	1									
C301.5	Describe the mechanisms involved in transport layer	4	K2	1,2,8,9,10,12	1									
C301.6	Classify different application layer protocols	5	K3	1,2,3,8,9,10,12	1									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C301.1	2	1	-	-	-	-	-	-	-	-	-	1	2	-
C301.2	3	2	1	-	-	-	-	1	1	-	-	1	2	-
C301.3	3	2	1	-	-	-	-	1	1	-	-	1	2	-
C301.4	3	2	1	-	-	-	-	1	1	1	-	1	2	-
C301.5	2	1	-	-	-	-	-	1	1	1	-	1	2	-
C301.6	3	2	1	-	-	-	-	1	1	1	-	1	2	-
C301	3	2	1	-	-	-	-	1	1	1	-	1	2	-

20CS502

SOFTWARE ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the phases in a software project
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies
- To design with static and dynamic UML diagrams.
- To learn various testing and maintenance measures

PRE-REQUISITE:NIL

UNIT-I SOFTWARE PROCESS AND AGILE DEVELOPMENT 10
Introduction to Software Engineering, Software Process, Process Models – Introduction to Agility-Agile process-Extreme programming-XP Process.

UNIT-II REQUIREMENTS ANALYSIS AND SPECIFICATION 8
Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

UNIT - III SOFTWARE DESIGN AND UML MODEL 9
Design Engineering: Design process and design quality, design concepts, the design model. Creating a Architectural Design: Architectural styles, Architectural Design, Architectural Mapping using Data Flow. Conceptual model of UML: basic structural modeling, use case diagram, class diagrams, sequence diagrams, collaboration diagrams, state chart diagram, activity diagram, component diagrams, deployment diagram

UNIT - IV TESTING AND MAINTENANCE 9
Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging. Maintenance and Reengineering- Reengineering process model-Reverse and Forward Engineering

UNIT - V PROJECT MANAGEMENT AND QUALITY ASSURANCE MODELS 9
Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model –Risk Management – Identification, Projection -RMMM Plan- Models for Quality Assurance – ISO–9000 – Series.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Roger S. Pressman, — Software Engineering – A Practitioner’s Approach, Eighth Edition, Mc Graw-Hill International Edition, 2015
2. Ian Sommerville, — Software Engineering, 10th Edition, Pearson Education Asia, 2016.
3. Craig Larman,— Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, Third Edition, Pearson Education 2005

REFERENCES:

1. Rajib Mall, — Fundamentals of Software Engineering, Third Edition, PHI Learning Private Limited, 2009.
2. Ali Bahrami - Object Oriented Systems Development - McGraw Hill International Edition - 1999.
3. Pankaj Jalote, “Software Engineering, A Precise Approach”, Wiley India, 2010.

Course Name : Software Engineering										Course Code: 20CS502				
CO	Course Outcomes										Unit	K-CO	POs	PSOs
C302.1	Explain the Software Process and Agile Development.										1	K2	1,2	1,2
C302.2	Identify the software requirements for classical analysis.										2	K3	1,2,3,8,9,12	1,2
C302.3	Develop the software design and UML models.										3	K3	1,2,3,5,8,9,12	1,2
C302.4	Compare various software testing and maintenance techniques.										4	K2	1,2,3,8,9,10,12	1,2
C302.5	Calculate the software project effort and cost.										5	K3	1,2,8,9,10,12	1,2
C302.6	Describe the software quality assurance models.										5	K2	1,2,8,9,10,12	1,2
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C302.1	2	1	-	-	-	-	-	-	-	-	-	-	-	1
C302.2	3	2	1	-	-	-	-	1	1	-	-	1	1	1
C302.3	3	2	1	-	1	-	-	1	1	-	-	1	1	1
C302.4	2	1	-	-	-	-	-	1	1	1	-	1	1	1
C302.5	3	2	1	-	-	-	-	1	1	1	-	1	1	1
C302.6	2	1	-	-	-	-	-	1	1	1	-	1	1	1
C302	3	2	1	-	1	-	-	1	1	1	-	1	1	1

20CS503

THEORY OF COMPUTATION

L	T	P	C
3	1	0	4

OBJECTIVES:

- To construct automata for any given pattern and find its equivalent regular expressions
- To design a context free grammar for any given language
- To understand Turing machines and their capability
- To know the relation between regular language, context free language and corresponding recognizers

PRE-REQUISITE:

Course code: 20BS303

Course Name: Discrete Mathematics

UNIT-I FINITE AUTOMATA

12

Introduction - Basic mathematical notation and techniques – Basic definitions: Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) - Language acceptance – Design of FA - Equivalence of NFA and DFA - Finite Automata with epsilon transitions - Equivalence of NFA's with and without epsilon transitions.

UNIT-II REGULAR EXPRESSIONS AND LANGUAGES

12

Regular Languages - Regular Expression - Equivalence of finite Automaton and regular expressions: Finite Automata into Regular Expression – Regular Expression into Finite Automata - Pumping Lemma for Regular sets – Problems based on Pumping Lemma.

UNIT - III CONTEXT FREE GRAMMAR AND LANGUAGES

12

Grammar Introduction– Types of Grammar - Context Free Grammars and Languages – Derivations and Languages – Ambiguity- Relationship between derivation and derivation trees – Simplification of CFG: Elimination of Null productions - Unit productions - Useless symbols – Normal Forms of CFG: Chomsky Normal Form (CNF) – Greiback Normal Form (GNF) – Problems related to CNF and GNF.

UNIT - IV PUSHDOWN AUTOMATA

12

Definition of the Pushdown Automata (PDA) – Instantaneous descriptions of PDA – Languages of a Pushdown Automata – Design of PDA for language sets - Equivalence of Pushdown Automata and CFG - Deterministic Pushdown Automata.

UNIT - V TURING MACHINE

12

Definition and representation of Turing machine – Language acceptance by Turing Machine - Computable languages and functions – Programming techniques for Turing machine construction – Recursive and Recursive enumerable languages - Properties of recursive and recursive enumerable languages - A language that is not Recursively Enumerable (RE) - Post's Correspondence Problem.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", 3rd Edition, Pearson Education, 2013.
2. J. Martin, "Introduction to Languages and the Theory of computation", 4th Edition, Tata

Mc Graw Hill, 2011.

REFERENCES:

1. Michael Sipser, "Introduction to the Theory of Computation", Third Edition, Cengage Learning, 2012.
2. H.S Behera, Janmenjoy Nayak and Hadibandhu Pattnayak, "Formal Languages and Automata Theory", Vikas Publishing House Pvt. Ltd, 2014.
3. Thomas A. Sudkamp," An Introduction to the Theory of Computer Science, Languages and Machines", Third Edition, Pearson Education, 2007.
4. Peter Linz, " An introduction to formal languages and Automata", 6th edition, Jones & Bartlett Learning, 2016.

Course Name : Theory Of Computation										Course Code: 20CS503				
CO	Course Outcomes										Unit	K-CO	POs	PSOs
C303.1	Construct finite automata for different regular expressions and languages										1	K3	1,2,3,8,9,10,12	1,2
C303.2	Develop context free grammar for the given languages										2	K3	1,2,3,8,9,12	1,2
C303.3	Transfer the context free grammar into its various normal forms										3	K3	1,2,3,8,9,12	1,2
C303.4	Develop Pushdown automata for the given languages										4	K3	1,2,3,8,9,12	1,2
C303.5	Construct Turing machine model for solving simple computational problems										5	K3	1,2,3,8,9,12	1,2
C303.6	Illustrate recursive and recursive enumerable languages										5	K3	1,2,3,8,9,10,12	1,2
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C303.1	3	2	1	-	-	-	-	2	2	1	-	1	3	1
C303.2	3	2	1	-	-	-	-	2	2	-	-	1	3	1
C303.3	3	2	1	-	-	-	-	2	2	-	-	1	3	1
C303.4	3	2	1	-	-	-	-	2	2	-	-	1	3	1
C303.5	3	2	1	-	-	-	-	2	2	-	-	1	3	1
C303.6	3	2	1	-	-	-	-	2	2	1	-	1	3	1
C303	3	2	1	-	-	-	-	2	2	1	-	1	3	1

20EC506	MICROCONTROLLERS AND EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study the Architecture of 8051 microcontroller.
- To study different interfacing device with microcontroller.
- To educate concepts of embedded system design and analysis.
- To learn the architecture of ARM processor and peripherals.
- To learn the basic concepts of embedded programming.

PRE-REQUISITE:

Course Code : 20CS301
 Course Name : Digital Principles and System Design

UNIT-I MICROCONTROLLER 9

Architecture of 8051 — Special Function Registers(SFRs) — I/O Pins Ports and Circuits — Instruction set — Addressing modes — Assembly language programming, Comparison of Microprocessor and Microcontroller.

UNIT-II 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.

UNIT - III INTRODUCTION TO EMBEDDED SYSTEM DESIGN 9

Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques - Designing with computing platforms – consumer electronics architecture – platform-level performance analysis.

UNIT - IV ARM PROCESSOR AND PERIPHERALS 9

ARM Architecture Versions – ARM Architecture – Instruction Set – Stacks and Subroutines – Features of the LPC 214X Family – Peripherals – The Timer Unit – Pulse Width Modulation Unit – UART.

UNIT - V EMBEDDED PROGRAMMING 9

Components for embedded programs- Models of programs- Assembly, linking and loading– compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Mohamed Ali Mazidi, Janice Gillispie Mazidi, RolinMcKinlay, "The 8051 Micro controller and Embedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011.

- Marilyn Wolf, Computers as Components: Principles of Embedded Computing System Design, Third Edition, Morgan Kaufmann Publisher, 2012.

REFERENCES:

- M.Senthilkumar, M.Saravanan, S.Jeevananthan, Microprocessors and Microcontrollers- OXFORD University Press 2013.
- Lyla B.Das, —Embedded Systems : An Integrated Approachll Pearson Education, 2013.
- Sriram V Iyer, Pankaj Gupta, —Embedded Real Time Systems Programmingll, Tata Mc Graw Hill, 2004.
- David. E. Simon, —An Embedded Software Primerll, 1st Edition, Fifth Impression, Addison- Wesley Professional, 2007

Course Name : Microcontrollers And Embedded Systems										Course Code: 20EC506				
CO	Course Outcomes										Unit	K-CO	POs	PSOs
C304.1	Describe the architecture of 8051 and its addressing modes.										1	K2	1,2	1
C304.2	Explain 8051 Assembly language Programs.										1	K2	1,2,8,9,10	1
C304.3	Discuss the microcontroller interfacing devices										2	K2	1,2,8,9,10	1
C304.4	Illustrate the concepts of embedded system design										3	K2	1,2,8,9	1
C304.5	Explain the architecture of ARM processor.										4	K2	1,2,8,9	1
C304.6	Discuss the basics of embedded programming										5	K2	1,2,8,9,10	1
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C304.1	2	1	-	-	-	-	-	-	-	-	-	-	1	-
C304.2	2	1	-	-	-	-	-	1	1	1	-	-	1	-
C304.3	2	1	-	-	-	-	-	1	1	1	-	-	1	-
C304.4	2	1	-	-	-	-	-	1	1	-	-	-	1	-
C304.5	2	1	-	-	-	-	-	1	1	-	-	1	1	-
C304.6	2	1	-	-	-	-	-	1	1	1	-	1	1	-
C304	2	1	-	-	-	-	-	1	1	1	-	1	1	-

20MC501

CONSTITUTION OF INDIA

L	T	P	C
1	0	0	0

OBJECTIVES:

- To enable the student to understand the importance of the constitution
- To understand the structure of executive, legislature, and judiciary
- To understand the philosophy of fundamental rights, duties and Emergency Provisions.
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court.
- To understand the central and state relation financial and administrative.

PRE-REQUISITE: NIL

UNIT-I INTRODUCTION

3

History of Making of the Indian Constitution-Drafting Committee- (Composition & Working) - Philosophy of the Indian Constitution-Preamble-Salient Features.

UNIT-II CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES

3

Fundamental Rights-Right to Equality-Right to Freedom-Right against Exploitation Right to Freedom of Religion-Cultural and Educational Rights-Right to Constitutional Remedies Directive Principles of State Policy-Fundamental Duties.

UNIT - III ORGANS OF GOVERNANCE

3

Parliament-Composition-Qualifications and Disqualifications-Powers and Functions-Executive President-Governor-Council of Ministers-Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions.

UNIT - IV EMERGENCY PROVISIONS

3

Emergency Provisions - National Emergency, President Rule, Financial Emergency

UNIT - V LOCAL ADMINISTRATION

3

District's Administration head- Role and Importance-Municipalities- Introduction- Mayor and role of Elected Representative-CEO of Municipal Corporation-Pachayati raj- Introduction-PRI- Zila PachayatElected officials and their roles- CEO ZilaPachayat- Position and role-Block level-Organizational Hierarchy (Different departments)-Village level- Role of Elected and Appointed officials-Importance of grass root democracy.

TOTAL: 15 PERIODS

TEXT BOOKS:

1. Rajesh Kumar, Universal's Guide to the Constitution of India. Universal Law Publications, 2016.
2. D.C. Gupta, Indian Government and Politics, Vikas Pub,2018.

REFERENCES:

1. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes, Universal Law Publication
2. J.C. Johari, Indian Government and Politics, Shoban Lal & Co, 2012.
3. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Rights Guarantees in India, Oxford University Press, 2012.

Course Name : Constitution Of India										Course Code: 20MC501				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C306.1	Explain history and philosophy of Indian Constitution.									1	K2	6,8,9,10	-	
C306.2	Explain the premises informing the twin themes of liberty and freedom from a civil rights perspective.									2	K2	6,8,9,10	-	
C306.3	Explain the powers and functions of Indian government									3	K2	6,8,9,10	-	
C306.4	Explain the emergency rules of Indian Constitution.									4	K2	6,8,9,10	-	
C306.5	Explain the structure and functions of local administration.									5	K2	6,8,9,10	-	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C306.1	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C306.2	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C306.3	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C306.4	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C306.5	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C306	-	-	-	-	-	3	-	2	2	2	-	-	-	-

20CS5L1

NETWORKS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To learn and use network commands.
- To learn socket programming.
- To implement and analyze various network protocols.
- To learn and use simulation tools.
- To use simulation tools to analyze the performance of various network protocols.

PRE-REQUISITE:NIL**LIST OF EXPERIMENTS**

1. Learn to use commands like TCP dump, netstat, ifconfig, nslookup and traceroute. Capture ping and trace route PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like:
 - a) Echo client and echo server
 - b) Chat
 - c) File Transfer
4. Simulation of DNS using UDP sockets.
5. Write a code simulating ARP /RARP protocols.
6. Write a program to implement RPC (Remote Procedure Call)
7. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
8. Study of TCP/UDP performance using Simulation tool.
9. Simulation of error correction code (like CRC).
10. Performance evaluation of Routing protocols using Simulation tool.
11. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.
 - a) Link State routing
 - b) Flooding
 - c) Distance vector

TOTAL: 60 PERIODS**LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS:**

1. Windows 7 or higher
2. C / C++ / Java / Python / Equivalent Compiler
3. Network simulator like NS2/Glomosim/OPNET/ Packet Tracer / Equivalent

Course Name : Networks Laboratory										Course Code: 20CS5L1				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
C307.1	Demonstrate the different Network Commands									1	K3	1,2,3,8,9,10,12	1,2	
C307.2	Develop Simple Socket Programming									2,3,4	K3	1,2,3,5,8,9,10,12	1,2	
C307.3	Develop the code for Data Link Layer Protocol Simulation									5,6	K3	1,2,3,5,8,9,10,12	1,2	
C307.4	Experiment with Congestion Control Algorithm using Network Simulator									7	K3	1,2,3,5,8,9,10,12	1,2	
C307.5	Develop the code for Transport Layer Protocol Simulation									8,9	K3	1,2,3,5,8,9,10,12	1,2	
C307.6	Illustrate the performance of various network Routing Protocols									10,11	K4	1,2,3,4,5,8,9,10,12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C307.1	3	2	1	-	-	-	-	2	2	3	-	2	2	2
C307.2	3	2	1	-	2	-	-	2	2	3	-	2	2	2
C307.3	3	2	1	-	2	-	-	2	2	3	-	2	2	2
C307.4	3	2	1	-	2	-	-	2	2	3	-	2	2	2
C307.5	3	2	1	-	2	-	-	2	2	3	-	2	2	2
C307.6	3	3	2	1	2	-	-	2	2	3	-	2	2	2
C307	3	3	1	1	2	-	-	2	2	3	-	2	2	2

Course Name : Software Engineering Laboratory										Course Code: 20CS5L2				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
C308.1	Build the SRS for a suggested system using software requirements.									1,2	K3	1,2,3,8,9,10	1,2	
C308.2	Construct the Data Flow Diagram(DFD) using software requirements.									3	K3	1,2,3,8,9,10	1,2	
C308.3	Examine the identified classes and functionality of the system using USE CASE model.									4,5	K4	1,2,3,4,8,9,10	1,2	
C308.4	Demonstrate the objects interaction and implementation models for the system.									6,7	K3	1,2,3,8,9,10	1,2	
C308.5	Demonstrate the code from system design.									8	K3	1,2,3,8,9,10	1,2	
C308.6	Analyze the developed code using testing strategies									9	K4	1,2,3,4,8,9,10	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C308.1	3	2	1	-	-	-	-	2	2	3	2	2	1	1
C308.2	3	2	1	-	2	-	-	2	2	3	2	2	1	1
C308.3	3	3	2	1	2	-	-	2	2	3	2	2	1	1
C308.4	3	2	1	-	2	-	-	2	2	3	2	2	1	1
C308.5	3	2	1	-	2	-	-	2	2	3	2	2	1	1
C308.6	3	3	2	1	2	-	-	2	2	3	2	2	1	1
C308	3	2	1	1	2	-	-	2	2	3	2	2	1	1

20EC5L3	MICROCONTROLLERS & EMBEDDED SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To write ALP for arithmetic and logical operations in 8051
- To differentiate Serial and Parallel Interface
- To interface different I/Os with Microcontroller
- To learn the working of ARM processor
- To write programs to interface memory, I/Os with ARM processor

PRE-REQUISITE:NIL

8051 Programs using kits

1. Basic arithmetic and Logical operations.
2. Code conversion
3. To find largest number from a given array of 8-bit numbers
4. Interfacing Traffic light controller
5. Interfacing Stepper motor control
6. Interfacing Serial and Parallel ports.

Programming using ARM Processor

1. Study of ARM evaluation system
2. Interfacing ADC and DAC.
3. Interfacing LED and PWM.
4. Interfacing real time clock and serial port.
5. Interfacing keyboard and LCD.

TOTAL: 60 PERIODS

LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE:

Microcontroller - 30 nos
 Interfacing Units - Each 10 nos
 Embedded trainer kits with ARM board 10 Nos
 Adequate quantities of Hardware, software and consumables

Course Name : Microcontrollers & Embedded Systems Laboratory		Course Code: 20EC5L3												
CO	Course Outcomes	Exp. No	K-CO	POs	PSOs									
C309.1	Write ALP Programs for Arithmetic and logical operations using 8051	1,2,3	K3	1,2,3,8,9,10	1									
C309.2	Interface different I/Os with 8051	4,5,6	K3	1,2,3,8,9,10	1									
C309.3	Explain interfacing with ARM processor	7	K2	1,2,8,9,10	1									
C309.4	Write programs in ARM for a specific Application	8,9	K3	1,2,3,8,9,10	1									
C309.5	Interface memory, A/D and D/A convertors with ARM system	10	K3	1,2,3,8,9,10	1									
C309.6	Write programs for interfacing keyboard, display and motor.	11	K3	1,2,3,8,9,10	1									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C309.1	3	2	1	-	-	-	-	2	2	3	-	-	1	-
C309.2	3	2	1	-	-	-	-	2	2	3	-	-	1	-
C309.3	2	1	-	-	-	-	-	2	2	3	-	-	1	-
C309.4	3	2	1	-	-	-	-	2	2	3	-	-	1	-
C309.5	3	2	1	-	-	-	-	2	2	3	-	-	1	-
C309.6	3	2	1	-	-	-	-	2	2	3	-	-	1	-
C309	3	2	1	-	-	-	-	2	2	3	-	-	1	-

20HS602

PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- Study the evolution of Management And organization types
- Learn the concepts involved in Planning process
- Explain how organizing is done by manager
- Detail on Human Resource Management and , Career planning
- Learn the importance of Motivation and leadership
- Detail on directing and controlling in Management

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management – Science or Art – Managerial roles and skills – Theories of Management- F.W.Taylor, Elton Mayo - Principles of Henry Fayol – Types of Business organization – Sole proprietorship, partnership, company- Types -public and private sector enterprises – Current trends and issues in Management.

UNIT-II PLANNING 9

Nature and purpose of planning – process – types – objectives – MBO- Policies – Planning premises- Tools and Techniques ; Strategic planning - Types – Decision making steps and process. Rational Decision Making Process - Decision Making under different conditions.

UNIT - III ORGANISING AND STAFFING 9

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Man Power planning- Recruitment & selection process, Training and Development, Performance Management , Career planning and management. Career Development - Career stages – Training - Performance Appraisal.

UNIT - IV DIRECTING 9

Foundations of individual and group behavior – motivation – motivation theories – Motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and role of information technology.

UNIT - V CONTROLLING 9

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – Cost Control - Purchase Control - Maintenance Control - Quality Control.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Stephen P. Robbins & Mary Coulter, —Managementll, Prentice Hall (India) Pvt. Ltd., 10th Edition, 2020.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert —Managementll, Pearson Education, 6th Edition, 2018.

REFERENCES:

1. Stephen A. Robbins & David A. Decenzo& Mary Coulter, —Fundamentals of Managementll Pearson Education, 7th Edition, 2019.
2. Robert Kreitner&MamataMohapatra, — Managementll, Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich —Essentials of managementll Tata McGraw Hill,2018.
4. Tripathy PC & Reddy PN - Principles of Management II, Tata McGraw Hill, 2016

Course Name : Principles Of Management											Course Code: 20HS601				
CO	Course Outcomes										Unit	K-CO	POs	PSOs	
C310.1	Explain the evolution of Management and organization types										1	K2	8,9,10,11	-	
C310.2	Demonstrate the concepts involved in Planning process										2	K2	8,9,10,11,12	-	
C310.3	Describe the organizing concept and its types.										3	K2	8,9,10,11	-	
C310.4	Explain the human resource management and, career planning process.										3	K2	8,9,10,11	-	
C310.5	Illustrate the importance of Motivation and leadership.										4	K2	8,9,10,11,12	-	
C310.6	Explain the directing and controlling in Management process.										5	K2	8,9,10,11	-	
CO-PO Mapping															
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
C310.1	-	-	-	-	-	-	-	2	2	2	1	-	-	-	
C310.2	-	-	-	-	-	-	-	2	2	2	1	1	-	-	
C310.3	-	-	-	-	-	-	-	2	2	2	1	-	-	-	
C310.4	-	-	-	-	-	-	-	2	2	2	1	-	-	-	
C310.5	-	-	-	-	-	-	-	2	2	2	1	1	-	-	
C310.6	-	-	-	-	-	-	-	2	2	2	1	-	-	-	
C310	-	-	-	-	-	-	-	2	2	2	1	1	-	-	

20CS601	MOBILE ARCHITECTURE AND PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic concepts of mobile computing.
- To learn the basics of mobile telecommunication system.
- To be familiar with the network layer protocols and Ad-Hoc networks.
- To know the basis of transport and application layer protocols.
- To gain knowledge about Android Programming and Native Development Kit.

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION 9
 Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies- Modulation - Multiplexing – Spread spectrum -MAC Protocols – SDMA- TDMA- FDMA- CDMA

UNIT-II MOBILE TELECOMMUNICATION ARCHITECTURE 9
 Introduction to Cellular Systems - GSM – Services & Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS, UMTS – Architecture – Handover - Security

UNIT - III MOBILE NETWORK LAYER 9
 Mobile IP – DHCP – AdHoc– Proactive Routing Protocol-DSDV, Reactive Routing Protocols – DSR, AODV, Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks (VANET) –MANET Vs VANET – Security

UNIT - IV MOBILE TRANSPORT AND APPLICATION LAYER 9
 Mobile TCP– WAP – Architecture – WDP – WTLS – WTP –WSP – WAE – WTA Architecture – WML

UNIT - V ANDROID PROGRAMMING & NATIVE DEVELOPMENT KIT 9
 Layers of Android- Android Components - Building on the Linux kernel - Running in the Dalvik VM, Introduction to NDK - Uses for the NDK - Building an application with the NDK - Building theJNI library:Understanding, Implementing the library, Compiling the JNI library

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jochen Schiller, —Mobile Communications, PHI, Second Edition, 2003.
2. W. Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz, Android in Action, Manning Publications, Third Edition, 2011.

REFERENCES:

1. Prasant Kumar Pattnaik, Rajib Mall, —Fundamentals of Mobile Computing, PHI Learning Pvt.Ltd, New Delhi – 2012.
2. Dharma Prakash Agarwal, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.

3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, —Principles of Mobile Computingll, Springer, 2003.
4. William.C.Y.Lee,—Mobile Cellular Telecommunications-Analog and Digital Systems, Second Edition,TataMcGraw Hill Edition ,2006.
5. C.K.Toth, —AdHoc Mobile Wireless Networksll, First Edition, Pearson Education, 2002.
6. Android Developers :<http://developer.android.com/index.html>

Course Name : Mobile Architecture And Programming		Course Code: 20CS601												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
C311.1	Explain the basics of mobile telecommunication systems	1	K2	1,2,8,9	1,2									
C311.2	Describe the architecture of telecommunication systems in wireless networks.	2	K2	1,2,8,9	1,2									
C311.3	Outline the different types of routing protocol for a given Ad hoc network.	3	K2	1,2,8,9,10	1,2									
C311.4	Discuss the functionality of Transport and Application layers.	4	K2	1,2,8,9,10	1,2									
C311.5	Build an application programming interface for android OS.	5	K3	1,2,3,8,9,12	1,2									
C311.6	Apply the JNI library for mobile application development	5	K3	1,2,3,8,9,10,12	1,2									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C311.1	2	1	-	-	-	-	-	1	1	-	-	-	1	2
C311.2	2	1	-	-	-	-	-	1	1	-	-	-	1	2
C311.3	2	1	-	-	-	-	-	1	1	1	-	-	1	2
C311.4	2	1	-	-	-	-	-	1	1	1	-	-	1	2
C311.5	3	2	1	-	-	-	-	1	1	-	-	1	1	2
C311.6	3	2	1	-	-	-	-	1	1	1	-	1	1	2
C311	2	1	1	-	-	-	-	1	1	1	-	1	1	2

20CS602	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand OSI security architecture and classical encryption techniques.
- To understand the Symmetric cryptography techniques.
- To understand the public key cryptography Systems.
- To understand the various message authentication functions.
- To understand the different level of security and services.

PRE-REQUISITE:

Course Code : 20CS501

Course Name : Computer Networks

UNIT-I INTRODUCTION 10

Security trends - Legal, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography).- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

UNIT-II SYMMETRIC CRYPTOGRAPHY 8

Mathematics Of Symmetric Key Cryptography: Algebraic structures - Modular arithmetic- Euclid’s algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 – Key distribution.

UNIT - III PUBLIC KEY CRYPTOGRAPHY 9

Mathematics Of Asymmetric Key Cryptography: Primes – Primality Testing – Factorization – Euler’s totient function, Fermat’s and Euler’s Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT - IV MESSAGE AUTHENTICATION AND INTEGRITY 9

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509

UNIT - V SECURITY PRACTICE AND SYSTEM SECURITY 9

Electronic Mail security – PGP, S/MIME – IP security – Web Security - SYSTEM SECURITY: Intruders – Malicious software – Malware, Ransomware – Viruses – Firewalls.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security: Principles and Practice, PHI 7th Edition, 2017.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2nd Edition 2017.

REFERENCES:

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd
2. Behrouz A. Forouzan, Cryptography and Network Security, Tata McGraw Hill 2007.
3. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.
4. Ulysess Black, "Internet Security Protocols", Pearson Education Asia, 2000
5. Bruce Schneier and Neils Ferguson, "Practical Cryptography", First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
6. Douglas R Simson "Cryptography – Theory and practice", First Edition, CRC Press, 1995.

Course Name : Cryptography And Network Security										Course Code: 20CS602				
CO	Course Outcomes										Unit	K-CO	POs	PSOs
C312.1	Describe the fundamental theory of cryptography and OSI security architecture in networks.										1	K2	1,2	1,2
C312.2	Apply the classical encryption techniques for network security.										1	K3	1,2,3,8,9,10,12	1,2
C312.3	Illustrate the different cryptographic operations of symmetric cryptographic algorithms										2	K3	1,2,3,8,9,10,12	1,2
C312.4	Illustrate the different cryptographic operations of public key cryptography										3	K3	1,2,3,8,9,12	1,2
C312.5	Apply the various security mechanisms to build different Authentication services.										4	K3	1,2,3,8,9,12	1,2
C312.6	Explain the various Security practices and System security standards.										5	K2	1,2,8,9,10,12	1,2
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C312.1	2	1	-	-	-	-	-	-	-	-	-	-	3	2
C312.2	3	2	1	-	-	-	-	1	1	1	-	1	3	2
C312.3	3	2	1	-	-	-	-	1	1	1	-	1	3	2
C312.4	3	2	1	-	-	-	-	1	1	-	-	1	3	2
C312.5	3	2	1	-	-	-	-	1	1	-	-	1	3	2
C312.6	2	1	-	-	-	-	-	1	1	1	-	1	3	2
C312	3	2	1	-	-	-	-	1	1	1	-	1	3	2
C312.1	2	1	-	-	-	-	-	-	-	-	-	-	3	2

20CS603

COMPILER DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the various phases of compiler.
- To learn the various parsing techniques.
- To understand intermediate code generation and run-time environment.
- To learn to implement front-end of the compiler.
- To learn to implement code generator.

PRE-REQUISITE:

Course Code : 20CS503

Course Name : Theory of Computation

UNIT-I INTRODUCTION TO COMPILERS 9

Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimizing DFA.

UNIT-II SYNTAX ANALYSIS 12

Role of Parser – Grammars – Error Handling – Context-free grammars – Writing a grammar – Top Down Parsing - General Strategies Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR(0) Item - Construction of SLR Parsing Table -Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC.

UNIT - III INTERMEDIATE CODE GENERATION 8

Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking.

UNIT - IV RUN-TIME ENVIRONMENT AND CODE GENERATION 8

Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management - Issues in Code Generation - Design of a simple Code Generator.

UNIT - V CODE OPTIMIZATION 8

Principal Sources of Optimization – Peep-hole optimization - DAG- Optimization of Basic Blocks-Global Data Flow Analysis - Efficient Data Flow Algorithm.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques and Tools II, Second Edition, Pearson Education, 2013.
2. V. Raghavan, Principles of Compiler Design II, Tata McGraw Hill Education Publishers, 2010.

REFERENCES:

1. Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, Advanced Compiler Design and Implementation, Morgan

- Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
3. Keith D Cooper and Linda Torczon, Engineering a Compiler, Morgan Kaufmann Publishers Elsevier Science, 2004.
 4. Allen I. Holub, Compiler Design in C, Prentice-Hall Software Series, 1993.

Course Name : Compiler Design										Course Code: 20CS603				
CO	Course Outcomes										Unit	K-CO	POs	PSOs
C313.1	Construct lexical analyzer for a sample language.										1	K3	1,2,3,8,9	1,2
C313.2	Apply different parsing algorithms to develop the parsers for a given grammar.										2	K3	1,2,3,8,9,10,12	1,2
C313.3	Describe the syntax-directed translation and run-time environment.										2	K2	1,2,8,9	1,2
C313.4	Develop code optimization techniques for source program.										3	K3	1,2,3,8,9,10,12	1,2
C313.5	Build a simple code generator for source program.										4	K3	1,2,3,8,9	1,2
C313.6	Develop a scanner and a parser using LEX and YACC tools.										5	K3	1,2,3,8,9,10,12	1,2
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C313.1	3	2	1	-	-	-	-	2	2	-	-	-	3	1
C313.2	3	2	1	-	-	-	-	2	2	1	-	1	3	1
C313.3	2	1	-	-	-	-	-	2	2	-	-	-	3	1
C313.4	3	2	1	-	-	-	-	2	2	1	-	1	3	1
C313.5	3	2	1	-	-	-	-	2	2	1	-	1	3	1
C313.6	3	2	1	-	-	-	-	2	2	-	-	-	3	1
C313	3	2	1	-	-	-	-	2	2	1	-	1	3	1

20MC601	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	L	T	P	C
		1	0	0	0

OBJECTIVES:

- Get a knowledge about Indian Culture
- Know Indian Languages, Literature, religion and philosophy and fine arts in India
- Explore the Science and Scientists of Ancient, Medieval and Modern India
- Understand education systems in India

PRE-REQUISITE: NIL

UNIT-I INTRODUCTION TO CULTURE 3

Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India.

UNIT-II INDIAN LANGUAGES AND LITERATURE 3

Indian Languages and Literature – I: Languages and Literature of South India, – Indian Languages and Literature – II: Northern Indian Languages & Literature.

UNIT - III RELIGION AND PHILOSOPHY 3

Major religions practiced in India and Understanding their Philosophy – religious movements in Modern India (Selected movements only)

UNIT - IV FINE ARTS IN INDIA (ART, TECHNOLOGY& ENGINEERING) 3

Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India

UNIT - V EDUCATION SYSTEM IN INDIA 3

Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

TOTAL: 15 PERIODS

TEXT BOOKS:

REFERENCES:

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", 2005
2. "Science in Samskrit", Samskrita Bharti Publisher, 2007
3. NCERT, "Position paper on Arts, Music, Dance and Theatre",
4. Narain, "Examinations in ancient India", Arya Book Depot, 1993
5. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, 1989
6. M. Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, 2014

Course Name : Essence Of Indian Traditional Knowledge		Course Code: 20MC601												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
C315.1	Explain philosophy of Indian culture.	1	K2	6,8,9,10	-									
C315.2	Distinguish the Indian languages and literature.	2	K2	6,8,9,10	-									
C315.3	Explain the philosophy of ancient, medieval and modern India.	3	K2	6,8,9,10	-									
C315.4	Acquire the information about the fine arts in India.	4	K2	6,8,9,10	-									
C315.5	Explain education systems in India	5	K2	6,8,9,10	-									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C315.1	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C315.2	-	-	-	-	-	2	-	2	2	2	-	-	-	-
C315.3	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C315.4	-	-	-	-	-	2	-	2	2	2	-	-	-	-
C315.5	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C315	-	-	-	-	-	3	-	2	2	2	-	-	-	-

20CS604	MACHINE LEARNING	L	T	P	C
		3	0	2	4
OBJECTIVES:					
<ul style="list-style-type: none"> • To understand the need for machine learning for various problem solving. • To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning. • To understand the latest trends in machine learning • To design appropriate machine learning algorithms for problem solving. 					
PRE-REQUISITE:NIL					
UNIT-I	SUPERVISED LEARNING: REGRESSION	9			
Paradigms of Machine Learning - Examples- Types of Learning - Types of supervised learning - Introduction to Regression - Linear regression - Geometrical Interpretation - Iterative solution: Gradient descent - Performance metrics of machine learning - Python libraries suitable for Machine Learning.					
LAB COMPONENT		6			
<ol style="list-style-type: none"> 1. Installing Anaconda-Jupyter Notebook-Learn Python ML Packages. 2. Implement data loading methods - understanding data with statistics, visualization - Data Preprocessing - Data Labeling. 					
UNIT-II	SUPERVISED LEARNING: CLASSIFICATION	9			
K-Nearest Neighbour Classification - Distance metric and Cross-Validation - Computational efficiency of KNN - Introduction to Decision Trees - Entropy and Information Gain - Naive Bayes classifier - Perceptron and its learning algorithm - Support Vector Machine.					
LAB COMPONENT		6			
<ol style="list-style-type: none"> 3. Logistic Regression Implementation: Implement the standard Logistic Regression model generally used for classifying data into binary classes such as pass/fail, win/lose, alive/dead or healthy/sick. 4. Decision Tree Implementation: Implement the standard Decision Tree Class used for classifying data into various classes using a tree-like model of decisions and their possible consequences. 					
UNIT - III	UNSUPERVISED LEARNING	9			
K-means Clustering - Lloyd's Algorithms - Convergence and Initialization - Covariance Matrix and Eigen direction - PCA					
LAB COMPONENT		6			
<ol style="list-style-type: none"> 5. Tumor Prediction: Detect Brain tumor images from the given data set. 6. Dimensionality Reduction: Analyze PCA for the appropriate data set. 					
UNIT - IV	RECOMMENDER SYSTEMS	9			
Recommender Systems - Introduction - Non-Personalized Recommender Systems - Content-Based Recommender Systems - Recommender System Evaluation					
LAB COMPONENT		6			
7. Movie/Book/Any Product recommendation by using content based filtering.					
UNIT - V	CASE STUDIES	9			

Text Classification: Build a classifier model using Naive Bayes algorithm to predict the topic of an article present in a newspaper. **Twitter Sentiment Analysis:** Analyse the tweets posted on twitter to predict the sentiment of the tweet i.e. positive, negative or neutral.

LAB COMPONENT

6

8. Mini Project

TOTAL: 75 PERIODS

TEXT BOKS:

1. Marc Peter Deisenroth, A. Aldo Faisal and Cheng Soon Ong, “Mathematics for Machine Learning”, Cambridge University Press, 2020.
2. Gopal sakarkar, gaurav patil and prateek dutta, “Machine Learning Algorithms using Python Programming”, Nova Science Publishers, Newyork, 2021.

REFERENCES:

1. Tom M. Mitchell, “Machine Learning”, McGraw-Hill Education (India) Private Limited, 2013.
2. Stephen Marsland, “Machine Learning: An Algorithmic Perspective”, CRC Press, 2009.
3. Mehryar Mohri, Afshin Rostamizadeh and Ameet Talwalkar, “Foundations of Machine Learning”, MIT Press, 2012.
4. Ethem Alpaydin, “Introduction to Machine Learning (Adaptive Computation and Machine Learning)”, The MIT Press, 2004.

Course Name : Machine Learning		Course Code: 20CS604												
CO	Course Outcomes					Unit	K-CO	POs	PSOs					
C316.1	Identify the category of the learning problem, and measure its performance like recall, precision etc.					1	K3	1,2,3,8,9,10,12	1,2					
C316.2	Apply the classification algorithms like K-NN, Decision Tree, Naive Bayes, Logistic Regression to label the data set.					2	K3	1,2,3,8,9,10,12	1,2					
C316.3	Apply unsupervised algorithms namely K-means and PCA to cluster the given data set.					3	K3	1,2,3,8,9,10,12	1,2					
C316.4	Apply Content-based recommender systems and Collaborative Filtering to implement recommender systems.					4	K3	1,2,3,8,9,10,12	1,2					
C316.5	Identify any societal problem and examine by applying acquired knowledge of machine learning in order to develop a mini project					5	K4	1,2,3,4,6,8,9,10,11,12	1,2					
C316.6	Combine all the modules of mini project through effective team work after efficient testing, and compile a detailed report.					5	K4	1,2,3,4,5,8,9,10,11,12	1,2					
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C316.1	3	2	1	-	-	-	-	2	2	2	-	2	3	1
C316.2	3	2	1	-	-	-	-	2	2	2	-	2	3	1
C316.3	3	2	1	-	-	-	-	2	2	2	-	2	3	1
C316.4	3	2	1	-	-	-	-	2	2	2	-	2	3	1
C316.5	3	3	2	1	-	1	-	2	2	2	1	2	3	1
C316.6	3	3	2	1	1	-	-	2	2	2	1	2	3	1
C316	3	2	1	1	1	1	-	2	2	2	1	2	3	1

20CS6L1	MOBILE APPLICATION DEVELOPMENT LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To understand the components and structure of mobile application development frameworks for Android OS based mobiles.
- To understand how to work with various mobile application development frameworks.
- To learn the basic and important design concepts and issues of development of mobile applications.
- To understand the capabilities and limitations of mobile devices

PRE-REQUISITE:NIL**LIST OF EXPERIMENTS**

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop an application that draws basic graphical primitives on the screen.
4. Develop an application that makes use of databases.
5. Develop an application that makes use of Notification Manager
6. Implement an application that uses Multi-threading
7. Develop a native application that uses GPS location information
8. Implement an application that writes data to the SD card.
9. Write a mobile application that creates alarm clock
10. Write a mobile application that makes use of RSS feed
11. Develop a mobile application to send an email.
12. Develop a Mobile application for simple needs (Mini Project)

TOTAL: 60 PERIODS**LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS:**

C / C++ / Java or equivalent compiler GnuPG, Snort, N-Stalker or Equivalent HARDWARE:
Standalone desktops - 30 Nos. (or) Server supporting 30 terminals or more.

Course Name : Mobile Application Development Laboratory										Course Code: 20CS6L1				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
C317.1	Develop mobile applications using GUI and Layouts.									1,2	K3	1,2,3,8,9,10,12	1,2	
C317.2	Develop mobile applications using Event Listener.									2,3	K3	1,2,3,8,9,10,12	1,2	
C317.3	Develop mobile applications using Databases.									4	K3	1,2,3,8,9,10,12	1,2	
C317.4	Develop mobile applications using Notification Manager									5	K3	1,2,3,8,9,10,12	1,2	
C317.5	Develop mobile applications using RSS Feed, Internal/External Storage, SMS, Multi- threading and GPS.									6,7,8	K3	1,2,3,8,9,10,12	1,2	
C317.6	Create own mobile app for simple needs									9-12	K6	1,2,3,4,5,6,8,9,10,11,12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C317.1	3	2	1	-	-	-	-	2	2	3	-	1	2	3
C317.2	3	2	1	-	-	-	-	2	2	3	-	1	2	3
C317.3	3	2	1	-	-	-	-	2	2	3	-	1	2	3
C317.4	3	2	1	-	-	-	-	2	2	3	-	1	2	3
C317.5	3	2	1	-	-	-	-	2	2	3	-	2	2	3
C317.6	3	3	2	1	1	1	-	2	3	3	1	3	2	3
C317	3	2	1	1	1	1	-	2	2	3	1	2	2	3

20CS6L2

WEB TECHNOLOGY LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To be familiar with web pages design using HTML, XML, Style Sheets.
- To be exposed to creation of user interfaces using Java Frames & Applets.
- To be able to create dynamic web pages using server side scripting.
- To learn to write server side applications.
- To be familiar with PHP & AJAX programming

PRE-REQUISITE:NIL

LIST OF EXPERIMENTS

1. Create Simple website with 5 pages (Home, About, Gallery, Course, Contact). Gallery and contact page with contact us form is must.
2. Create a web page with the following using HTML
 - i) To embed an image map in a web page ii) To fix the hot spots iii) Show all the related information when the hot spots are clicked.
3. Create a web page with all types of Cascading style sheets.
4. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient.
5. Client Side Scripts for Validating Web Form Controls using DHTML
6. Write programs in Java to create applets incorporating the following features: Create a color palette with matrix of buttons Set background and foreground of the control text area by selecting a color from color palette. In order to select Foreground o background use check box control as radio buttons To set background images
7. Write programs in Java using Servlets: To invoke servlets from HTML forms To invoke servlets from Applets
8. Write programs in Java to create three-tier applications using JSP and Databases for conducting on-line examination for displaying student mark list. Assume that student information is available in database which has been stored in a database server.
9. Programs using XML – Schema – XSLT/XSL
10. Programs using AJAX 10.
11. Programs using PHP for real time applications.

TOTAL: 60 PERIODS

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS:

SOFTWARE: Dream Weaver or Equivalent, MySQL or Equivalent, NetBeans

Course Name : Web Technology Laboratory										Course Code: 20CS6L2				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
C318.1	Discuss web pages using HTML/XML and style sheets									1-4	K2	1,2,8,9,10	2	
C318.2	Explain the connectivity of databases using JDBC									8	K2	1,2,8,9,10	2	
C318.3	Analyze user interfaces using Java frames and applets									6,7	K4	1,2,3,4,8,9, 10,12	2	
C318.4	Compare and contrast dynamic web pages using server side scripting									5	K4	1,2,3,4,8,9, 10,12	2	
C318.5	Make use of JSP frameworks build a Client Server application									8	K3	1,2,3,8, 9, 10,12	2	
C318.6	Develop an interactive web applications using AJAX and PHP									9-11	K3	1,2,3,5,8,9,10,11,12	2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C318.1	2	1	-	-	-	-	-	2	2	1	-	-	-	2
C318.2	2	1	-	-	-	-	-	2	2	1	-	-	-	2
C318.3	3	3	2	1	-	-	-	2	2	3	-	1	-	2
C318.4	3	3	2	1	-	-	-	2	2	3	-	1	-	2
C318.5	3	2	1	-	-	-	-	2	2	3	-	1	-	2
C318.6	3	2	1	-	1	-	-	2	3	3	3	1	-	2
C318	3	2	1	1	1	-	-	2	2	3	3	1	-	2

**PROFESSIONAL ELECTIVES (PE)
SEMESTER VI ELECTIVE – I**

20CS6A1	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand data warehouse concepts, architecture, business analysis and tools
- To understand data pre-processing and data visualization techniques
- To study algorithms for finding hidden and interesting patterns in data
- To understand and apply various classification and clustering techniques using tools.

PRE-REQUISITE:

Course Code : 20CS402

Course Name : Database Management Systems

UNIT-I DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING (OLAP) 9

Basic Concepts - Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors - Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies - Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP

UNIT-II DATA MINING - INTRODUCTION 9

Introduction– Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns. 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 - III FREQUENT PATTERN ANALYSIS 9

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns

UNIT - IV CLASSIFICATION AND CLUSTERING 9

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines —Clustering Techniques – Cluster Analysis-Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis

UNIT - V DATA MINING TOOLS 9

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database – Data mining tools: WEKA, Hadoop, Spark, R tool – Learning algorithms, Clustering algorithms, Association–rule learners.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.
2. Alex Berson and Stephen J.Smith, Data Warehousing, Data Mining & OLAP, Tata McGraw – Hill Edition, 5th Reprint 2016.

REFERENCES:

1. K.P. Soman, Shyam Diwakar and V. Ajay, Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006.
2. Ian H.Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.
3. Daniel T.Larose, “Data Mining Methods and Models”, Wiley-Interscience, 2006.
- 4.

Course Name : Data Warehousing And Data Mining										Course Code: 20CS6A1				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
CE314.1	Discuss data warehouse system and business analysis with OLAP tools.									1	K2	1,2	1,2	
CE314.2	Describe various pre-processing and visualization techniques for data analysis.									2	K2	1,2,8,9,10	1,2	
CE314.3	Apply frequent pattern and association rule mining techniques.									3	K3	1,2,3,8,9,10	1,2	
CE314.4	Select and apply an appropriate classification algorithm for labeled data.									4	K3	1,2,3,8,9,10,12	1,2	
CE314.5	Apply various clustering techniques for unlabeled data.									4	K3	1,2,3,8,9,10,12	1,2	
CE314.6	Apply learning and clustering algorithms using data mining tools.									5	K3	1,2,3,8,9,10,12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE314.1	2	1	-	-	-	-	-	-	-	-	-	-	2	1
CE314.2	2	1	-	-	-	-	-	1	1	1	-	-	2	1
CE314.3	3	2	1	-	-	-	-	1	1	1	-	-	2	1
CE314.4	3	2	1	-	-	-	-	1	1	1	-	1	2	1
CE314.5	3	2	1	-	-	-	-	1	1	1	-	1	2	1
CE314.6	3	2	1	-	-	-	-	1	1	1	-	1	2	1
CE314	3	2	1	-	-	-	-	1	1	1	-	1	2	1

20CS6A2	COMPUTER GRAPHICS AND MULTIMEDIA	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To gain knowledge about graphics hardware devices and software used.
- To understand the two dimensional graphics and their transformations.
- To understand the three dimensional graphics and colour models.
- To understand the multimedia design and file handling.
- To understand the hypermedia

PRE-REQUISITE:

Course Code: 20BS101

Course Name: Fundamentals of Engineering Mathematics

UNIT-I INTRODUCTION 9

Survey of computer graphics, Overview of graphics systems – Video display devices, Raster scan systems, Random scan systems, Graphics monitors and Workstations, Input devices, Hard copy Devices, Graphics Software; Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms.

UNIT-II TWO DIMENSIONAL GRAPHICS 9

Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; widow-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations – point, line, and polygon clipping algorithms.

UNIT - III THREE DIMENSIONAL GRAPHICS AND COLOUR MODELS 9

Three dimensional concepts; Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations - Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces -B-Spline curves and surfaces. TRANSFORMATION AND VIEWING: Three dimensional geometric and modeling transformations –Translation, Rotation, Scaling, composite transformations; Three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping; Properties of light - Standard primaries and chromaticity diagram; Intuitive colour concepts - RGB colour model - YIQ colour model - CMY colour model - HSV colour model - HLS colour model

UNIT - IV MULTIMEDIA SYSTEM DESIGN AND FILE HANDLING 9

Multimedia basics – Multimedia applications – Multimedia system architecture – Evolving technologies for multi media – defining objects for multimedia systems – Multimedia data interface standards – Multimedia data bases. Compression and decompression – Data and file format standards – Multimedia I/O technologies – Digital voice and audio – Video image and animation – Full motion video – Storage and retrieval technologies.

UNIT - V HYPERMEDIA

9

Multimedia authoring and user interface - Hypermedia messaging -Mobile messaging – Hypermedia message component – Creating hypermedia message – Integrated multimedia message standards – Integrated document management – Distributed multimedia systems

TOTAL: 45 PERIODS

TEXT BOOKS:

1. John F. Hughes, Andries Van Dam, Morgan Mc Guire ,David F. Sklar , James D. Foley, Steven K. Feiner and Kurt Akeley , "Computer Graphics: Principles and Practice", 3rd Edition, Addison- Wesley Professional,2014.
2. Andleigh.P.K and KiranThakrar, "Multimedia Systems and Design", PHI ,2003

REFERENCES:

1. Donald Hearn and Pauline Baker M, "Computer Graphics", Prentice Hall, New Delhi, 2014.
2. Jeffrey McConnell, "Computer Graphics: Theory into Practice", Jones and Bartlett Publishers,2010.
3. Malay K Pakhira, "Computer Graphics, Multimedia and Animation", PHI Learning India, 2010.
4. Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, Kelvin Sung, and AK Peters, Fundamental of Computer Graphics, CRC Press, 2010.

Course Name : Computer Graphics And Multimedia										Course Code: 20CS6A2				
CO	Course Outcomes										Unit	K-CO	POs	PSOs
CE314.1	Explain the hardware devices and software used in graphics systems.										1	K2	1,2	1,2
CE314.2	Apply the two and three dimensional geometric transformations in graphics systems.										2,3	K3	1,2,3,8,9,10,12	1,2
CE314.3	Discuss the various graphics colour models										3	K2	1,2	1,2
CE314.4	Apply various algorithms in two and three dimensional viewing and clipping process.										3	K3	1,2,3,8,9,10,12	1,2
CE314.5	Outline the concept of multimedia design and file handling methods.										4	K2	1,2,8,9,10	1,2
CE314.6	Describe the Hypermedia and Distributed multimedia systems										5	K2	1,2,8,9,10	1,2
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE314.1	2	1	-	-	-	-	-	-	-	-	-	-	2	1
CE314.2	3	2	1	-	-	-	-	1	1	1	-	1	2	1
CE314.3	2	1	-	-	-	-	-	-	-	-	-	-	2	1
CE314.4	3	2	1	-	-	-	-	1	1	1	-	1	2	1
CE314.5	2	1	-	-	-	-	-	1	1	1	-	-	2	1
CE314.6	2	1	-	-	-	-	-	1	1	1	-	-	2	1
CE314	2	1	1	-	-	-	-	-	-	-	-	-	2	1

20CS6A3	GRAPH THEORY AND APPLICATIONS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand fundamentals of graph theory.
- To study proof techniques related to various concepts in graphs.
- To apply graph theory based proofs in solving practical problems
- To explore modern applications of graph theory.

PRE-REQUISITE:

Course Code : 20BS303

Course Name : Discrete Mathematics

UNIT-I INTRODUCTION 9

Introduction - Graph Terminologies - Types of Graphs - Sub Graph- Multi Graph - Regular Graph - Isomorphism - Isomorphic Graphs - Sub-graph - Euler graph - Hamiltonian Graph - Related Theorems.

UNIT-II TREES & CONNECTIVITY 9

Trees -Properties- Distance and Centres - Types - Rooted Tree-- Tree Enumeration- Labeled Tree - Unlabeled Tree - Spanning Tree - Fundamental Circuits- Cut Sets - Properties - Fundamental Circuit and Cut-set- Connectivity- Separability -Related Theorems.

UNIT - III NETWORK FLOWS 9

Network Flows - Planar Graph - Representation - Detection - Dual Graph - Geometric and Combinatorial Dual - Related Theorems - Digraph - Properties - Euler Digraph.

UNIT - IV MATRIX REPRESENTATION 9

Matrix Representation - Adjacency matrix- Incidence matrix- Circuit matrix - Cut-set matrix - Path Matrix- Properties - Related Theorems - Correlations. Graph Coloring - Chromatic Polynomial - Chromatic Partitioning - Matching - Covering - Related Theorems

UNIT - V GRAPH ALGORITHMS 9

Graph Algorithms- Connectedness and Components- Spanning Tree- Fundamental Circuits- Cut Vertices- Directed Circuits- Shortest Path - Applications overview.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Narsingh Deo, "Graph Theory with Application to Engineering and Computer Science", Prentice-Hall of India Pvt.Ltd, 2003.
2. L.R.Foulds , "Graph Theory Applications", Springer ,2016.

REFERENCES:

1. Bondy, J. A. and Murty, U.S.R., "Graph Theory with Applications", North Holland Publication,2008.
2. West, D. B., —Introduction to Graph Theory, Pearson Education, 2011.
3. John Clark, Derek Allan Holton, —A First Look at Graph Theory, World Scientific Publishing Company, 1991.
4. Diestel, R, "Graph Theory", Springer,3rd Edition,2006.
5. Kenneth H.Rosen, "Discrete Mathematics and Its Applications", Mc Graw Hill , 2007.

Course Name : Graph Theory And Applications		Course Code: 20CS6A3													
CO	Course Outcomes	Unit	K-CO	POs	PSOs										
CE314.1	Classify mathematical definitions of objects in graph theory	1	K2	1,2,12	1										
CE314.2	Explain the concept of vertex connectivity and edge connectivity in graphs	2	K2	1,2,8,9,10,12	1										
CE314.3	Discuss the fundamental concept of network flows and planner graphs	3	K2	1,2,12	1										
CE314.4	Solve Geometric and Combinatorial Dual problems	4	K3	1,2,3,8,9,10,12	1										
CE314.5	Solve graph coloring problems	4	K3	1,2,3,8,9,10,12	1										
CE314.6	Apply suitable graph models and algorithms for solving applications	5	K3	1,2,3,8,9,10,12	1										
CO-PO Mapping															
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CE314.1	2	1	-	-	-	-	-	-	-	-	-	1	1	-	
CE314.2	2	1	-	-	-	-	-	1	1	1	-	1	1	-	
CE314.3	2	1	-	-	-	-	-	-	-	-	-	1	1	-	
CE314.4	3	2	1	-	-	-	-	1	1	1	-	1	1	-	
CE314.5	3	2	1	-	-	-	-	1	1	1	-	1	1	-	
CE314.6	3	2	1	-	-	-	-	2	2	1	-	1	1	-	
CE314	3	2	1	-	-	-	-	1	1	1	-	1	1	-	

20CS6A4

SYSTEM SOFTWARE

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the relationship between system software and machine architecture.
- To know the design and implementation of assemblers.
- To know the design and implementation of linkers and loaders.
- To have an understanding of macroprocessors.
- To have an understanding of system software tools.

PRE-REQUISITE:

Course Code : 20CS401

Course Name : Computer Organization and Architecture

UNIT-I INTRODUCTION

8

System software and machine architecture – The Simplified Instructional Computer (SIC) - Machine architecture - Data and instruction formats - addressing modes -instruction sets - I/O and programming.

UNIT-II ASSEMBLERS

10

Basic assembler functions - A simple SIC assembler – Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes – Program relocation - Machine independent assembler features - Literals –Symbol-defining statements – Expressions - One pass assemblers and Multi pass assemblers - Implementation example - MASM assembler.

UNIT - III LOADERS AND LINKERS

9

Basic loader functions - Design of an Absolute Loader – A Simple Bootstrap Loader - Machine dependent loader features - Relocation – Program Linking – Algorithm and Data Structures for Linking Loader - Machine-independent loader features - Automatic Library Search – Loader Options - Loader design options - Linkage Editors – Dynamic Linking – Bootstrap Loaders - Implementation example - MSDOS linker.

UNIT - IV MACRO PROCESSORS

9

Basic macro processor functions - Macro Definition and Expansion – Macro Processor Algorithm and data structures - Machine-independent macro processor features - Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters-Macro within Macro-Implementation example - MASM Macro Processor – ANSI C Macro language.

UNIT - V SYSTEM SOFTWARE TOOLS

9

Text editors - Overview of the Editing Process - User Interface – Editor Structure. - Interactive debugging systems - Debugging functions and capabilities – Relationship with other parts of the system – User-Interface Criteria.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Leland L. Beck, D. Manjula, “System Software – An Introduction to Systems Programming”, 3rd Edition, Pearson Education Asia, 2012.
2. D. M. Dhamdhare, “Systems Programming and Operating Systems”, Second Revised Edition, Tata McGraw-Hill, 2000.

REFERENCES:

1. John J. Donovan “Systems Programming”, Tata McGraw-Hill Edition, 2000.
2. John R. Levine, “Linkers & Loaders” – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2000.
3. Santanu Chattopadhyay, “System Software”-PHI Learning Pvt.Ltd., 2007

Course Name : System Software										Course Code: 20CS6A4				
CO	Course Outcomes										Unit	K-CO	POs	PSOs
CE314.1	Explain the concept of machine architecture.										1	K2	1,2,12	-
CE314.2	Discuss machine dependent and machine independent assemblers.										2	K2	1,2,8,9,10	-
CE314.3	Explain the design of loaders and linkers.										3	K2	1,2,8,9,10	-
CE314.4	Describe machine dependent and machine independent loaders										3	K2	1,2	-
CE314.5	Outline the concept of designing macro processors										4	K2	1,2	-
CE314.6	Explain the text editor process of system software.										5	K2	1,2,8,9,10,12	-
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE314.1	2	1	-	-	-	-	-	-	-	-	-	1	1	-
CE314.2	2	1	-	-	-	-	-	1	1	1	-	-	1	-
CE314.3	2	1	-	-	-	-	-	1	1	1	-	-	1	-
CE314.4	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CE314.5	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CE314.6	2	1	-	-	-	-	-	1	1	1	-	1	1	-
CE314	2	1	-	-	-	-	-	1	1	1	-	1	1	-

20HS6A2	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To develop and strengthen entrepreneurial quality in students.
- To gain knowledge on Entrepreneurial Environment for nurturing the new startups
- To impart basic entrepreneurial skills like Ideation, Product development, and Project Management
- To bring the concept of Financing and Management of small enterprise.
- To implement concept of Technopreneurship more efficiently and effectively

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION 5
 Definition & structure of Entrepreneurship - Entrepreneurial Culture- Origin of Entrepreneurship - Characteristics of an Entrepreneur - Qualities and Skills of Entrepreneur – Types of Entrepreneurs – Women Entrepreneurs

UNIT-II ENTREPRENEURIAL ECOSYSTEM 10
 Entrepreneurial Environment - Role of Family and Society -Entrepreneurship Development Program(EDP)- EDP Training-Institutions in support of Entrepreneurship (SIPCOT,EDC,ITCOT) - Central and State Government Industrial Policies and Regulations-Incubation.

UNIT - III PROJECT MANAGEMENT 10
 Ideation/Innovation – Product Planning and Development Process-Projects and its classification-Project life Cycle-Phases of Project Management-Project Identification and Selection- Project Formulation - Project Appraisal.

UNIT - IV LAUNCHING AND MANAGING OF SMALL ENTERPRISE 10
 Ownership Structure - Financial Planning, Human resource mobilization-Operations planning-Market and channel selection. Venture capital – IT startups and its case studies

UNIT - V TECHNOPRENEURSHIP 10
 E-Commerce – Application – Benefits – Limitation – Opportunities-Resources Required-Operation & Problems, Security & Safety of Business Transaction, Encryption, Digital Signature, Cybercrime, Mode of Payment -EFT, E-check, E-Money, Credit Cards, Debit Cards, Smart Cards, M-Commerce, Application of M-Commerce

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Vasant Desai, “Dynamics of Entrepreneurial Development and Management”, Himalaya Publishing House, Sixth Edition, 2019.
2. S.S.Khanka, “Entrepreneurial Development”, S.Chand and Company Limited, New Delhi,(Revised Edition) 2013.
3. Dr.R.C.Bhatia, “Entrepreneurship Business and Management”, Sultan Chand & Sons.EducationalPublishers,New Delhi, 2020

REFERENCES:

1. Drucker, Peter. “Innovation and Entrepreneurship”. United Kingdom, Routledge, 2015.

2. Hisrich, "Entrepreneurship", Edition 9, Tata McGraw Hill, New Delhi, 2014.
3. Mathew Manimala, Entrepreneurship Theory at the Crossroads, Paradigms & Praxis, Biztrantra, 2nd Edition, 2005.
4. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill, 1996
5. Donal F Kuratko, T.V.Rao, Entrepreneurship: A South Asian Perspective, Cengage, 2012

Course Name : Entrepreneurship Development										Course Code: 20HS6A2				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
CE314.1	Explain the qualities of an Entrepreneur and his Role in startup.									1	K2	8,9	-	
CE314.2	Illustrate the Entrepreneurial Environment for bringing more ventures									2	K2	8,9	-	
CE314.3	Determine the ideation, Product Development, and Project Management									3	K2	8,9,10,11	-	
CE314.4	Illustrate Finance planning and capital venture									4	K2	8,9	-	
CE314.5	Explain the use of ownership in the small business.									5	K2	8,9,10	-	
CE314.6	Explain the E- Commerce and M-Commerce for the Technopreneurship Development.									5	K2	8,9	-	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE314.1	-	-	-	-	-	-	-	2	2	-	-	-	-	-
CE314.2	-	-	-	-	-	-	-	2	2	-	-	-	-	-
CE314.3	-	-	-	-	-	-	-	2	2	1	1	-	-	-
CE314.4	-	-	-	-	-	-	-	2	2	-	1	-	-	-
CE314.5	-	-	-	-	-	-	-	2	2	1	-	-	-	-
CE314.6	-	-	-	-	-	-	-	2	2	-	-	-	-	-
CE314	-	-	-	-	-	-	-	2	2	1	1	-	-	-

20IT6A2

SOFTWARE TESTING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the basics and necessity of software testing.
- To provide various testing techniques along with concepts of software bugs and its impact.
- To develop and validate a test plan.
- To build a testing team required.
- To understand the need for and challenges in test automation and to develop testing scripts.

PRE-REQUISITE:

Course Code: 20CS502

Course Name: Software Engineering

UNIT-I TESTING PRINCIPLES AND AXIOMS 9

Testing as a Process – Testing Axioms –Software Testing Principles – Origins and Cost of Defects – The Tester’s Role in a Software Development Organization-Defect Classes and Examples – Developer/Tester Support of Developing a DefectRepository – Defect Prevention Strategies.

UNIT-II BLACK BOX, WHITE BOX TESTING AND TEST ADEQUACY 9

Test Case Design Strategies – Black Box Approach – Boundary Value Analysis – Equivalence Class Partitioning – State-Based Testing – User Documentation Testing – White Box Approach – Static Testing vs. Structural Testing – Cause effect graphing-Error guessing-Compatibility Testing-Code Functional Testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – Cyclomatic Complexity – Test Adequacy Criteria.

UNIT - III LEVELS OF TESTING 9

Unit Test – Planning – Designing the Unit Test Process – Running the Unit Tests and Recording Results – Integration Test Planning – Scenario Testing – Defect Bash Elimination System Testing – Acceptance Testing – Performance Testing – Regression Testing –Internationalization Testing – Ad-Hoc Testing – Alpha, Beta Tests-Usability and Accessibility testing-Configuration Testing- Website Testing.

UNIT - IV TEST MANAGEMENT 9

Organization Structures For Testing Teams – Testing Services – Test Planning Attachments– Locating Test Items – Test Management – Reporting Test Results – The Role of Three Groups in Test Planning and Policy Development – Introducing the Test Specialist – Skills Needed by a Test Specialist – Building a Testing Group- Agile and DevOps.

UNIT - V TEST AUTOMATION 9

Software Test Automation – Design and Architecture for Automation – Requirements for a Test Tool – Testing tools for Automated Software Testing -Challenges in Automation -Test Metrics and Measurements – Project, Progress and Productivity Metrics – Maintenance of Documents During Testing. Identifying and performing various levels of testing for a case study : Online Banking Process, Email Login Process.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Paul C. Jorgensen, "Software Testing: A Craftsman's Approach", Fourth Edition, CRC Press, 2013.
2. Dorothy Graham, Mark Fewster, "Experiences of Test Automation: Case Studies of Software Test Automation", Pearson Education, 2012.

REFERENCES:

1. Glenford J. Myers, Tom Badgett, Corey Sandler, "The Art of Software Testing", Third Edition, John Wiley & Sons, 2012.
2. Srinivasan Desikan, Gopaldaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2009.
3. Boris Beizer, "Software Testing Techniques", Dream Tech Press, 2009.
4. Mauro Pezze, Michal Young, "Software Testing and Analysis Process Principles and Techniques", Wiley India, 2008.
5. Ali Mili, Fairouz Chier, "Software Testing: Concepts and Operations", Wiley, 2015

Course Name : Software Testing		Course Code: 20IT6A2												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
CE314.1	Obtain an insight to software testing.	1	K2	1,2,10	1									
CE314.2	Apply both black box testing and white box testing.	2	K3	1,2,3,12	2									
CE314.3	Understand and apply multiple levels of testing.	3	K2	1,2,10	1									
CE314.4	Understand the role of a tester as an individual and as a team member.	4	K2	1,2,12	1									
CE314.5	Apply software testing for large projects using automated testing tools.	4	K3	1,2,3,10	2									
CE314.6	Maintain documentation on testing.	5	K2	1,2,12										
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE314.1	2	1	-	-	-	-	-	-	-	1	-	-	1	-
CE314.2	3	2	1	-	-	-	-	-	-	-	-	1	-	1
CE314.3	2	1	-	-	-	-	-	-	-	1	-	-	1	-
CE314.4	2	1	-	-	-	-	-	-	-	-	-	1	1	-
CE314.5	3	2	1	-	-	-	-	-	-	1	-	-	-	1
CE314.6	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CE314	3	2	1	-	-	-	-	-	-	1	-	1	1	1

20IT6A4

REAL TIME SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide good understanding of fundamental concepts in real time systems.
- To provide understanding of advanced topics in real time systems.
- To provide understanding on basic multi-task scheduling algorithms for periodic, a periodic, andsporadic tasks as well as understand the impact of the latter two on scheduling
- To expose to understand capabilities of commercial off-the-shelf R-T kernel.
- To expose to real time communications and databases.

PRE-REQUISITE:

Course Code: 20CS404 & 20EC506

Course Name: Operating Systems & Microcontrollers and Embedded Systems

UNIT-I INTRODUCTION 9

Real-time systems – Applications – Basic Model – Characteristics – Safety and Reliability – Real- Time tasks – Timing Constraints – Modelling Timing Constraints.

UNIT-II SCHEDULING REAL-TIME TASKS 9

Concepts – Types of RT Tasks and their Characteristics – Task Scheduling – Clock-Driven Scheduling – Hybrid Schedulers - Event-Driven Scheduling – EDF Scheduling – RMA – Issues with RMA – Issues in Using RMA in Practical Situations

UNIT - III RESOURCE SHARING AMONG RT TASKS & SCHEDULING RT TASKS 9

Resource Sharing Among RT Tasks – Priority Inversion – PIP – HLP – PCP – Types of Priority Inversions Under PCP – Features of PCP – Issues in using Resource Sharing Protocol – Handling Task Dependencies – Multiprocessor Task Allocation – Dynamic Allocation of Tasks – Fault-Tolerant Scheduling of Tasks – Clocks in Distributed RT Systems – Centralized and Distributed Clock Synchronization

UNIT - IV COMMERCIAL RT OPERATING SYSTEMS 9

Time Services – Features of RT OS – Unix as a RT OS – Unix Based RT OS – Windows as a RT OS – POSIX – Survey of RTOS: PSOS – VRTX – VxWorks – QNX - µC/OS-II – RT Linux – Lynx –Windows CE – Benching RT Systems

UNIT - V RT COMMUNICATION & DATABASES 9

Examples of Applications Requiring RT Communication – Basic Concepts – RT Communication in a LAN – Soft & Hard RT Communication in a LAN – Bounded Access Protocols for LANs – Performance Comparison – RT Communication Over Packet Switched Networks – QoS Framework – Routing – Resource Reservation – Rate Control – QoS Models - Examples Applications of RT Databases – RT Databases – Characteristics of Temporal Data – Concurrency Control in RT Databases – Commercial RT Databases.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Rajib Mall, "Real-Time Systems: Theory and Practice," Pearson, 2008.
2. Philip Laplante, "Real-Time Systems Design and Analysis: Tools for the Practitioner:", 4th Edition, A John Wiley & Sons, 2011.

REFERENCES:

1. Krishna and Shin, "Real-Time Systems," Tata McGraw Hill. 1999.
2. Alan C. Shaw, "Real-Time Systems and Software", Wiley, 2001.
3. Jane W. Liu, "Real-Time Systems" Pearson Education, 2001.
4. Resource Management in Real-time Systems and Networks, C. Siva Ram Murthy and G.Manimaran, MIT Press, March 2001.

Course Name : Real Time Systems							Course Code: 20IT6A4							
CO	Course Outcomes						Exp. No	K-CO	POs	PSOs				
CE314.1	Understand the basics and importance of real-time systems						1	K2	1,2,10					
CE314.2	Generate a high-level analysis document based on requirements specifications						2	K2	1,2,12					
CE314.3	Generate a high-level design document based on analysis documentation						3	K2	1,2,10					
CE314.4	Generate a test plan based on requirements specification						4	K2	1,2,12					
CE314.5	Generate a validation plan based on all documentation						4	K2	1,2,10					
CE314.6	Understand basic multi-task scheduling algorithms for periodic, aperiodic, and sporadic tasks as well as understand the impact of the latter two on scheduling						2	K2	1,2,12					
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE314.1	2	1	-	-	-	-	-	-	-	1	-	-	1	-
CE314.2	2	1	-	-	-	-	-	-	-	-	-	1	1	-
CE314.3	2	1	-	-	-	-	-	-	-	1	-	-	1	-
CE314.4	2	1	-	-	-	-	-	-	-	-	-	1	1	-
CE314.5	2	1	-	-	-	-	-	-	-	1	-	-	1	-
CE314.6	2	1	-	-	-	-	-	-	-	-	-	1	1	-
CE314	2	1	-	-	-	-	-	-	-	1	-	1	1	-

20CS701

DATA ANALYTICS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the basic concepts of Data Analytic.
- To Handle missing data in the real world data sets by choosing appropriate methods
- To Learn data analysis methods
- To learn stream computing
- To Understand and apply Data Analysis Techniques
- To gain knowledge on Hadoop related tools

PRE-REQUISITE:

Course Code: 20CS604

Course Name: Machine Learning

UNIT-I INTRODUCTION

9

Knowledge domains of Data Analysis, Understanding structured and unstructured data, data analytic tools, applications of data analytics, various phases of data analytics lifecycle – discovery, data preparation, model planning, model building, communicating results, operationalization.

UNIT-II DATA PREPROCESSING

9

Data Preprocessing : Data Cleaning – Data Integration - Data Reduction – Data Transformation Handling Missing Data: Introduction to Missing data, Traditional methods for dealing with missing data, Maximum Likelihood Estimation – Basics, Missing data handling, improving the accuracy of analysis

UNIT - III CLASSIFICATION AND CLUSTERING

9

Statistical Methods: Regression modelling, Multivariate Analysis - Classification: SVM & Kernel Methods - Rule Mining - Cluster Analysis, Types of Data in Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Clustering High Dimensional Data - Predictive Analytics.

UNIT - IV INTELLIGENT DATA ANALYSIS

9

Analysis of Time Series : Linear and Non Linear Systems Analysis, Neural Networks : Fundamentals – Back Propagation Neural Network – Fuzzy Logic : Basics of Fuzzy Sets and Fuzzy Logic - Genetic Algorithms

UNIT - V

HADOOP – HDFS concepts, Algorithms using MapReduce, Introduction to NoSQL, Cassandra, Pig, Hive.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. John Wiley & Sons, Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC Education Services (Editor),2015
2. Craig K. Enders, “Applied Missing Data Analysis”, The Guilford Press, 2010.
3. Michael Berthold, David J. Hand, —Intelligent Data Analysis, Springer, Second Edition, 2007.

REFERENCES:

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Wiley, 2012
2. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
3. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.

Course Name : Data Analytics							Course Code: 20CS701							
CO	Course Outcomes						Exp. No	K-CO	POs	PSOs				
C401.1	Explain the basic concepts of Data Analytics						1	K2	1, 2, 8, 9	1				
C401.2	Describe the Data Analysis preprocessing Techniques.						2	K2	1, 2, 8,9, 10	1				
C401.3	Explain about how missing data will be handled during preprocessing						2	K2	1, 2, 8,9, 10	1				
C401.4	Apply the Classification and Clustering algorithms for real time applications						3	K3	1,2,3,8, 9,12	1				
C401.5	Apply intelligent analytics techniques like neural networks, fuzzy and genetic algorithms for real time analytics applications						4	K3	1, 2, 3,8,9	1				
C401.6	Explain the Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics						5	K2	1,2,5, 8,9, 12	1,2				
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C401.1	2	1	-	-	-	-	-	1	1	-	-	-	1	-
C401.2	2	1	-	-	-	-	-	1	1	1	-	-	1	-
C401.3	2	1	-	-	-	-	-	1	1	1	-	-	1	-
C401.4	3	2	1	-	-	-	-	1	1	-	-	1	1	-
C401.5	3	2	1	-	-	-	-	1	1	-	-	1	1	-
C401.6	2	1	-	-	1	-	-	1	1	-	-	1	1	2
C	2	1	1	-	1	-	-	1	1	1	-	1	1	1

20CS702

ARTIFICIAL INTELLIGENCE

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the various characteristics of Intelligent agents
- To learn the different search strategies in AI
- To learn to represent knowledge in solving AI problems
- To understand the different ways of designing software agents
- To know about the various applications of AI.

PRE-REQUISITE: NIL

UNIT-I INTRODUCTION 9

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

UNIT-II PROBLEM SOLVING METHODS 9

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search - Game Playing – Optimal Decisions in Games – Alpha - Beta Pruning - Stochastic Games.

UNIT - III KNOWLEDGE REPRESENTATION 9

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining- Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering- Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information.

UNIT - IV SOFTWARE AGENTS 9

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

UNIT - V APPLICATIONS 9

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach, Prentice Hall, Third Edition, 2011.
2. I Brakto, Prolog: Programming for Artificial Intelligence, Fourth Edition, Addison-Wesley Educational Publishers Inc., 2011.

REFERENCES:

1. M. Tim Jones, Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, The Quest for Artificial Intelligence, Cambridge University Press, 2009.

3. William F. Clocksin and Christopher S. Mellish, Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003.
4. Gerhard Weiss, Multi Agent Systems, Second Edition, MIT Press, 2013.
5. David L. Poole and Alan K. Mackworth, Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

Course Name : Artificial Intelligence		Course Code: 20CS702												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
C402.1	Explain the concept of intelligent agent and various problem solving approaches.	1	K2	1, 2, 8,9	1									
C402.2	Determine the appropriate search algorithms for any AI problem	2	K2	1, 2, 8,9	1									
C402.3	Discuss the suitable agent strategy to solve a given problem.	2	K2	1, 2, 8,9	1									
C402.4	Illustrate first order and predicate logic for a given problem	3	K3	1, 2, 3, 8,9	1									
C402.5	Explain software agents components to solve a problem	4	K2	1, 2, 8,9	1									
C402.6	Summarize the different applications that use Artificial Intelligence	5	K2	1, 2, 8,9	1									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C402.1	2	1	-	-	-	-	-	1	1	1	-	-	2	-
C402.2	2	1	-	-	-	-	-	1	1	1	-	-	2	-
C402.3	2	1	-	-	-	-	-	1	1	1	-	-	2	-
C402.4	3	2	1	-	-	-	-	1	1	1	-	-	2	-
C402.5	2	1	-	-	-	-	-	1	1	1	-	-	2	-
C402.6	2	1	-	-	-	-	-	1	1	1	-	-	2	-
C	2	1	1	-	-	-	-	1	1	1	-	-	2	-

20CS7L1

DATA ANALYTICS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To implement numerical and statistical analysis on various data sources
- To apply data pre-processing techniques
- To implement linear regression technique on numeric data for prediction
- To execute classification and clustering algorithms on different datasets
- To implement and evaluate the performance of KNN algorithm on different datasets

PRE-REQUISITE:NIL**LIST OF EXPERIMENTS**

1. Write a Program to Read and write operations on different types of Files (csv, xls, txt etc).
2. Implement a program for statistical operations such as Mean, Median, Mode and Standard deviation.
3. Implement data pre-processing operations
 - a. Handling Missing data
 - b. Min-Max normalization
4. Write a Program to implement Linear Regression Model on given dataset
5. Write a Program to implement logistic regression to perform classification on given dataset.
6. Write a Program to implement Simple Naïve Bayes classification algorithm on given dataset.
7. Write a Program to implement K-Means clustering operation and visualize for given dataset.
8. Write a Program to diagnose any disease using KNN classification and plot the results.
9. Create Visualization:
 - a. Find the data distributions using box and scatter plot.
 - b. Find the outliers using plot.
 - c. Plot the histogram, bar chart and pie chart on sample data.
10. Mini Project

TOTAL: 60 PERIODS**LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

Software Requirements: R / Python

Course Name : Data Analytics Laboratory										Course Code: 20CS7L1				
CO	Course Outcomes									Exp. No.	K-CO	POs	PSOs	
C406.1	Build numerical and statistical analysis on various data sources									1,2	K3	1,2,3,8,9,10, 12	1,2	
C406.2	Apply data preprocessing and dimensionality reduction methods on raw data									3	K3	1,2,3,8,9,10, 12	1,2	
C406.3	Apply the different regression technique on given dataset									4,5	K3	1,2,3,8,9,10, 12	1,2	
C406.4	Apply the classification and clustering algorithms on different datasets									6,7,8	K3	1,2,3,8,9,10, 12	1,2	
C406.5	Apply appropriate visualization techniques for presenting the data									9	K3	1,2,3,8,9,10, 12	1,2	
C406.6	Solve the real world data analysis problems.									10	K4	1,2,3,4,5,6,8,9,10,11, 12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C406.1	3	2	1	-	-	-	-	2	2	2	-	2	1	2
C406.2	3	2	1	-	-	-	-	2	2	2	-	2	1	2
C406.3	3	2	1	-	-	-	-	2	2	2	-	2	1	2
C406.4	3	2	1	-	-	-	-	2	2	2	-	2	1	2
C406.5	3	2	1	-	-	-	-	2	2	2	-	2	1	2
C406.6	3	3	2	1	1	1	-	2	2	2	2	2	1	2
C	3	2	1	1	1	1	-	2	2	2	1	2	1	2

20CS7L2

MINI PROJECT

L T P C
0 0 4 2

OBJECTIVES:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4, works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The first and second review will be evaluated by a three member internal committee. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on third review's oral presentation and the submission of project report, before the internal examiners which was constituted by the Head of the Department.

PRE-REQUISITE:NIL

TOTAL: 60 PERIODS

Course Name : Mini Project							Course Code: 20CS7L2							
CO	Course Outcomes						Experiments	K-CO	POs			PSOs		
C407.1	Identify a problem and its applicability along with suitable domain.						-	K3	1,2,3,6,7,8,9,10, 11,12			1,2		
C407.2	Analyze and formulate project modules and identified constraints based on environmental and societal impact.						-	K4	1,2,3,4,5,6,7,8,9,10,11,12			1,2		
C407.3	Select efficient tools and methods for designing and implementing project modules.						-	K4	1,2,3,4,5,6,7,8,9,10,11,12			1,2		
C407.4	Propose an effective solution for the problem identified with the help of developed methodology and tools						-	K6	1,2,3,4,5,6,7,8,9,10,11,12			1,2		
C407.5	Summarize all the modules through effective integration and testing.						-	K5	1,2,3,4,5,6,7,8,9,10,11,12			1,2		
C407.6	Illustrate the completed task and compile the project report.						-	K4	1,2,3,4,5,6,7,8,9,10,11,12			1,2		
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C407.1	3	2	1	-	-	3	3	3	3	3	2	2	3	3
C407.2	3	3	2	1	2	3	3	2	2	2	3	2	3	3
C407.3	3	3	2	1	3	2	2	2	2	2	3	2	3	3
C407.4	3	3	3	3	3	3	3	2	2	2	3	2	3	3
C407.5	3	3	3	2	3	3	3	2	2	2	3	2	3	3
C407.6	3	3	2	1	1	1	1	3	3	3	2	2	3	3

C	3	3	2	2	2	3	3	3	3	3	3	2	3	3
20CS8L1		PROJECT WORK									L	T	P	C
											0	0	20	0
OBJECTIVES:														
To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.														
The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.														
PRE-REQUISITE:NIL														
TOTAL: 300 PERIODS														

Course Name : Project Work										Course Code: 20CS811				
CO	Course Outcomes									Experiments	K-CO	POs	PSOs	
C410.1	Identify a domain and problem by applying required domain knowledge.										K3	1,2,3,6,7,8,9,10, 11,12	1,2	
C410.2	Analyze and categorize executable project modules including real time project constraints based on environmental and societal impact.										K4	1,2,3,4,5,6,7,8,9,10,11,12	1,2	
C410.3	Examine efficient tools and methods for designing and implementing project modules.										K4	1,2,3,4,5,6,7,8,9,10,11,12	1,2	
C410.4	Develop effective solution for the problem identified with the help of proposed methodology and tools										K6	1,2,3,4,5,6,7,8,9,10,11,12	1,2	
C410.5	Assess all the modules through effective integration, optimization and testing.										K5	1,2,3,4,5,6,7,8,9,10,11,12	1,2	
C410.6	Elaborate the completed task and compile the project report.										K4	1,2,3,4,5,6,7,8,9,10,11,12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C410.1	3	2	1	-	-	3	3	3	3	3	2	2	3	3
C410.2	3	3	2	1	2	3	3	2	2	2	3	2	3	3
C410.3	3	3	2	1	3	2	2	2	2	2	3	2	3	3
C410.4	3	3	3	3	3	3	3	2	2	2	3	2	3	3
C410.5	3	3	3	2	3	3	3	2	2	2	3	2	3	3
C410.6	3	3	2	1	1	1	1	3	3	3	2	2	3	3
C410	3	3	2	2	2	3	3	3	3	3	3	2	3	3

SEMESTER VII ELECTIVE II

20CS7A1	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the concept of cloud computing.
- To appreciate the evolution of cloud from the existing technologies.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION 9

Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.

UNIT-II CLOUD ENABLING TECHNOLOGIES 9

Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish-Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices – Virtualization Support and Disaster Recovery.

UNIT - III CLOUD ARCHITECTURE, SERVICES AND STORAGE 9

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - IaaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

UNIT - IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD 10

Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.

UNIT - V CLOUD TECHNOLOGIES AND ADVANCEMENTS 8

Hadoop – MapReduce – Virtual Box - Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Rittinghouse, John W., and James F. Ransome, Cloud Computing: Implementation, Management and Security, CRC Press, 2017.

REFERENCES:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach, Tata Mcgraw Hill, 2009.
3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009

Course Name : Cloud Computing										Course Code: 20CS7A1				
CO	Course Outcomes										Unit	K-CO	POs	PSOs
CE404.1	Describe the main concepts, key technologies, strengths and limitations of cloud computing.										1	K2	1,2,8,9	1,2
CE404.2	Explain the key and enabling technologies that help in the development of cloud.										2	K2	1,2,8,9	1,2
CE404.3	Discuss the usage of architecture of compute and storage cloud, service and delivery models.										3	K2	1,2,8,9	1,2
CE404.4	Explain the core issues of cloud computing such as resource management and security.										4	K2	1,2,8,9	1,2
CE404.5	Illustrate the security features to be adopted in cloud.										4	K2	1,2,8,9	1,2
CE404.6	Infer the appropriate technologies, algorithms and approaches for implementation and use of cloud										5	K3	1,2,3, 8,9	1,2
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE404.1	2	1	-	-	-	-	-	1	1	1	-	-	2	2
CE404.2	2	1	-	-	-	-	-	1	1	1	-	-	2	2
CE404.3	2	1	-	-	-	-	-	1	1	1	-	-	2	2
CE404.4	2	1	-	-	-	-	-	1	1	1	-	-	2	2
CE404.5	2	1	-	-	-	-	-	1	1	1	-	-	2	2
CE404.6	3	2	1	-	-	-	-	1	1	1	-	-	2	2
C	2	1	1	-	-	-	-	1	1	1	-	-	2	2

20CS7A2

AGILE METHODOLOGIES

L	T	P	C
3	0	0	3

OBJECTIVES:

- To Provide iterative, incremental development process leads to faster delivery of more useful software.
- To provide a good understanding of software design and a set of software technologies and APIs.
- To do a detailed examination and demonstration of Agile development and testing techniques and Analyze the essence of agile development methods.
- To understand the benefits and pitfalls of working in an Agile team and Develop prototyping in the software process..
- To understand Agile development and testing.

PRE-REQUISITE:NIL

UNIT-I FUNDAMENTALS OF AGILE 9

The Genesis of Agile – Introduction and background – Agile Manifesto and Principles – Overview of Scrum – Extreme Programming – Feature Driven development – Lean Software Development – Agile project management – Design and development practices in Agile projects - Continuous Integration – Refactoring - Pair Programming - Simple Design - Agile Tools.

UNIT-II 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 – Burndown chart – Sprint planning and retrospective – Daily scrum – Scrum roles –Product Owner - Scrum Master - Scrum Team - Scrum case study - Tools for Agile project management.

UNIT - III AGILE REQUIREMENTS ENGINEERING AND TESTING 9

Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment – Concurrency in Agile Requirements Generation – The Agile lifecycle and its impact on testing –Test Driven Development (TDD) – acceptance tests and scenarios – Planning and managing testing cycle – Exploratory testing - Risk based testing - Regression tests - Test Automation – Tools to support the Agile tester.

UNIT - IV AGILE SOFTWARE DESIGN AND DEVELOPMENT 9

Agile design practices- Role of design Principles including Single Responsibility Principle- Open Closed Principle- Liskov Substitution Principle – Interface Segregation Principles- Dependency Inversion Principle in Agile Design - Need and significance of Refactoring- Refactoring Techniques- Continuous Integration - Automated build tools - Version control.

UNIT - V QUALITY ASSURANCE AND INDUSTRYTRENDS 9

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance – Agile Approach in Global Software Development. Agile applicability-Agile in Distributed teams – Business benefits –Challenges in Agile – Risks and Mitigation.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Hazza and Dubinsky, Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, 2009
2. Ken Schawber, Mike Beedle, Agile Software Development with Scrum, Pearson, 2008.
3. Robert C.Martin, Agile Software Development, Principles, Patterns and Practices, Prentice Hall, 2002.

REFERENCES:

1. Lisa Crispin, Janet Gregory, "AgileTesting: A Practical Guide for Testers and AgileTeams", Addison Wesley, 2008
2. Kevin C. Desouza, Agile Information Systems: Conceptualization, Construction, and Management, Butterworth Heinemann, 2007
3. Alistair Cockburn, Agile Software Development: The Cooperative Game", Addison Wesley, 2006.
4. Mike Cohn Publisher, "User Stories Applied: For Agile Software", Addison Wesley, 2004
5. Craig Larman, Agile and Iterative Development: A Manager's Guide, Addison Wesley, 2004.

Course Name : Agile Methodologies										Course Code: 20CS7A2				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
CE404.1	Explain the fundamentals of agile and project management									1	K2	1, 2, 8,9,11	1,2	
CE404.2	Discuss the components of agile scrum framework.									2	K2	1, 2, 8, 9	1,2	
CE404.3	Discuss the requirements engineering process in agile.									3	K2	1, 2, 8,9	1,2	
CE404.4	Describe the different types of testing in agile framework.									3	K2	1, 2,5, 8, 9	1,2	
CE404.5	Explain Agile software design and development practices.									4	K2	1, 2,8,9, 11	1,2	
CE404.6	Illustrate agile quality assurance framework and Industry Trends									5	K2	1, 2, 5, 8,9	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE404.1	2	1						1	1	1	1		1	2
CE404.2	2	1						1	1	1	1		1	2
CE404.3	2	1						1	1	1	1		1	2
CE404.4	2	1			1			1	1	1			1	2
CE404.5	2	1						1	1	1	1		1	2
CE404.6	2	1			1			1	1	1			1	2
C	2	1			1			1	1	1	1		1	2

20CS7A3

JAVA SCRIPTING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand Definition, Evolution and Nature of JavaScript
- To understand the basics of Script Writing
- To Learn Java Script Names, Objects, and Methods
- To Create Dynamic Web Pages

- To understand the method of Adding Interactivity to a Web Page.

PRE-REQUISITE:NIL

UNIT-I HTML5 10
 introduction to HTML5 – Working with Forms: Accessing the form element, The form object, Accessibility, Validation, Using form-based navigation, Form widgets in libraries. Errors and Exceptions, Animation, Multimedia, Debugging.

UNIT-II INTRODUCTION TO JAVA SCRIPT 8
 JAVA Script Basics: An introduction to JavaScript– Advantages & Limitations of Java Script. Syntax, Variables, Variable Naming Rules and JavaScript Data Types, Expressions and Operators, Flow Control, Objects and Arrays, Functions and Methods.

UNIT - III JAVASCRIPT OBJECTS 9
 JavaScript DOM Model-Date and Objects,- Regular Expressions- Exception Handling- Validation-Built-in objects-Event Handling, DHTML with JavaScript.

UNIT - IV ADDING INTERACTIVITY TO A WEB PAGE 9
 Controlling Script Flow, Storing Tasks within Functions, Using Conditional Statements for Decision Making, ifStatements, if-else Conditional Statements, Using the Date Object, for Conditional Statements, while Conditional Statements, break and continue Statements, Creating Functions in JavaScript, Declaring a Function, Designing a Simple Function, Form Validation function.

UNIT - V ADVANCED JAVA SCRIPT 9
 Scripted HTTP, jQuery: Basics, Handling events with jQuery, Asynchronous JavaScript and Extensible Markup Language (AJAX), Extensible Markup Language (XML) and JavaScript Object Notation (JSON)
 Dynamic data using jQuery.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. David Flanagan JavaScript: The Definitive Guide, 6th Edition,O'Relly, 2011
2. David Sawyer McFarland JavaScript & jQuery: The Missing Manual 3rd Edition, 2014

REFERENCES:

1. Marijn Haverbeke Eloquent JavaScript 3rd Edition, No Starch Press, 2018
2. Michael Moncur Teach yourself Java Script in 24 Hours SAMS Publication 2007

Course Name : Java Scripting		Course Code: 20CS7A3													
CO	Course Outcomes	Unit	K-CO	POs	PSOs										
CE404.1	Summarize about HTML and develop a script to validate input	1	K3	1, 2, 3, 8,9	1										
CE404.2	Generalize the basic concepts about Java Script Programming such as variables, Data Types and Expressions	2	K2	1, 2, 8,9	1										
CE404.3	Explain Java Script Document Object Model	3	K2	1, 2, 8,9	1										
CE404.4	Illustrate about various Java Script statements and functions	4	K2	1, 2, 8,9	1										
CE404.5	Make use of Java Script events in Client side programming	5	K3	1, 2, 3, 8,9	2										
CE404.6	Discuss about Web Services and Other Markup Languages	5	K2	1, 2, 8,9	2										
CO-PO Mapping															
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CE404.1	3	2	1					1	1	1			2		
CE404.2	2	1						1	1	1			2		
CE404.3	2	1						1	1	1			2		
CE404.4	2	1						1	1	1			2		
CE404.5	3	2	1					1	1	1				2	
CE404.6	2	1						1	1	1				2	
C	2	1	1					1	1	1			2	2	

REFERENCES:

1. Publisher, 2015.
2. Richard M Reese, Natural Language Processing with Java, O Reilly Media, 2015.
3. Nitin Indurkha and Fred J. Damerau, Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
4. Tanveer Siddiqui, U.S. Tiwary, Natural Language Processing and Information Retrieval, Oxford University Press, 2008

Course Name : Natural Language Processing										Course Code: 20CS7A4				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
CE404.1	Explain the basic challenges of NLP and describe a given text with basic Language features									1	K2	1,2, 8&9	1,2	
CE404.2	Classify the various word class analysis involved in NLP and tokenization the given text									2	K2	1,2, 8&9	1,2	
CE404.3	Discuss the rule based system to tackle morphology and syntax of a language									3	K2	1,2,8&9	1,2	
CE404.4	Explain the basic knowledge of Semantic Analysis									4	K2	1,2, 8&9	1,2	
CE404.5	Compute word similarity using different thesaurus and distributional methods									4	K3	1, 2, 3, 8&9	1,2	
CE404.6	Generalise the use of different statistical approaches for different types of NLP applications									5	K3	1, 2, 3, 8&9	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE404.1	2	1						1	1	1			2	2
CE404.2	2	1						1	1	1			2	2
CE404.3	2	1						1	1	1			2	2
CE404.4	2	1						1	1	1			2	2
CE404.5	3	2	1					1	1	1			2	2
CE404.6	3	2	1		2			1	1	1			2	2
C	2	1	1		2			1	1	1			2	2

20CS7A5	ADVANCED TOPICS ON DATABASES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the modeling and design of databases.
- To acquire knowledge on parallel and distributed databases and their applications.
- To study the usage and applications of Object Oriented and Intelligent databases.
- To understand the usage of advanced data models.
- To learn web databases such as XML, Cloud and Big Data.
- To acquire inquisitive attitude towards research topics in databases

PRE-REQUISITE:

Course code: 20CS402

Course name: Database Management Systems

UNIT-I PARALLEL AND DISTRIBUTED DATABASES 9

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Design of Parallel Systems- Distributed Database Concepts - Distributed Data Storage

UNIT-II OBJECT AND OBJECT RELATIONAL DATABASES 9

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL/Oracle – Case Studies.

UNIT - III INTELLIGENT DATABASES 9

Active Databases: Syntax and Semantics (Starburst, Oracle, DB2)- Taxonomy- Applications- Design Principles for Active Rules- Temporal Databases: Overview of Temporal Databases- TSQL2- Deductive Databases: Logic of Query Languages – Datalog- Recursive Rules- Syntax and Semantics of Datalog Languages- Implementation of Rules and Recursion - Spatial Databases- Spatial Data Types- Spatial Relationships- Spatial Data Structures- Spatial Access Methods.

UNIT - IV WEB AND CLOUD DATABASES 9

XML Databases: XML-Related Technologies-XML Schema- XML Query Languages- Storing XML in Databases-XML and SQL- Native XML Databases- Web Databases- Geographic Information Systems- Biological Data Management- Cloud Based Databases: Data Storage Systems on the Cloud- Cloud Storage Architectures-Cloud Data Models- Introduction to Big Data-Storage-Analysis.

UNIT - V EMERGING TECHNOLOGIES 9

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Multimedia Databases- Information Retrieval- Data Warehousing - Data Mining- Text Mining.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Sixth Edition , Pearson, 2011.
2. Thomas Cannolly and Carolyn Begg, Database Systems, A Practical Approach to Design, Implementation and Managementll, Fourth Edition, Pearson Education, 2008

REFERENCES:

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, Database System Concepts, Sixth Edition, McGraw Hill, 2011.
2. C.J.Date, A.Kannan, S.Swamynathan, An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.
3. Carlo Zaniolo, Stefano Ceri, Christos Faloutsos, Richard T.Snodgrass, V.S.Subrahmanian, Roberto Zicari, Advanced Database Systems, Morgan Kaufmann publishers, 2006.

Course Name : Advanced Topics on DBMS										Course Code: 20BS402				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
CE404.1	Explain the database system Architecture and Query processing on parallel systems									1	K2	1, 2, 8,9	1	
CE404.2	Illustrate object methods, structure and object relational features using SQL									2	K3	1, 2, 3, 8,9	1	
CE404.3	Explain design principles of Active data bases and Spatial, temporal databases									3	K2	1, 2, 5, 8,9	1	
CE404.4	Discuss XML schema, Web database and cloud database.									4	K2	1, 2, 8,9	1	
CE404.5	Explain Mobile Transaction models and multimedia data management									5	K2	1, 2, 8,9	1	
CE404.6	Explain feature of data storage and different mining techniques									5	K2	1, 2, 5, 8,9	1	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE404.1	2	1						1	1	1			2	
CE404.2	3	2	1					1	1	1			2	
CE404.3	2	1			1			1	1	1			2	
CE404.4	2	1						1	1	1			2	
CE404.5	2	1						1	1	1			2	
CE404.6	2	1			1			1	1	1			2	
C	2	1	1		1			1	1	1			2	

20IT601

INTERNET OF THINGS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn Smart Objects and IOT Architectures
- To learn about various IOT-related protocols
- To build simple IOT Systems using Arduino and Raspberry Pi.
- To learn data analytics and cloud in the context of IOT
- To develop IOT infrastructure for popular applications

PRE-REQUISITE:NIL

UNIT-I FUNDAMENTALS OF IOT 9

Evolution of Internet of Things – Enabling Technologies – IOT Architectures: oneM2M, IOT World Forum (IOT WF) and Alternative IOT models – Simplified IOT Architecture and Core IOT Functional Stack – Fog, Edge and Cloud in IOT – Functional blocks of an IOT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects - Threats of IOT.

UNIT-II IOT PROTOCOLS 9

IOT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and Lora WAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IOT: From 6LoWPAN to 6Lo.

UNIT - III IOT PROTOCOLS – II AND DEVELOPMENT 9

Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT - IOT system building blocks – Arduino – Board details, IDE programming – Raspberry Pi – Interfaces and Raspberry Pi with Python Programming.

UNIT - IV DATA ANALYTICS AND SUPPORTING SERVICES 9

Structured Vs Unstructured Data and Data in Motion Vs Data in Rest – Role of Machine Learning – No SQL Databases – Hadoop Ecosystem – Apache Kafka, Apache Spark – Edge Streaming Analytics and Network Analytics – Xively Cloud for IOT, Python Web Application Framework – Django – AWS for IOT – System Management with NETCONF-YANG.

UNIT - V CASE STUDIES/INDUSTRIAL APPLICATIONS 9

Cisco IOT system – IBM Watson IOT platform – Manufacturing – Converged Plantwide Ethernet Model (CPwE) – Power Utility Industry – GridBlocks Reference Model – Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, — IOT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017

- Arshdeep Bahga, Vijay Madiseti, —Internet of Things – A hands-on approach, Universities Press, 2015 Pearson Education, 2007.

REFERENCES:

- Olivier Hersent, David Boswarthick, Omar Elloumi , The Internet of Things – Key applications and Protocols, Wiley, 2012 .
- Jan Höller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence, Elsevier, 2014.
- Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), Architecting the Internet of Things, Springer, 2011.
- Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O’Reilly Media, 2011.

Course Name : Internet Of Things		Course Code: 20IT601												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
CE404.1	Understand the concept of IOT.	1	K2	1,2										
CE404.2	Realize various protocols for IOT.	2	K2	1,2										
CE404.3	Design a PoC of an IOT system using Raspberry Pi/Arduino	3	K3	1,2,3	1.2									
CE404.4	Apply data analytics and use cloud offerings related to IOT.	4	K3	1,2,3	1,2									
CE404.5	Understand the different IOT systems	5	K2	1,2	1,2									
CE404.6	Build applications of IOT in real time scenario	5	K4	1,2,3,4	1,2									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE404.1	2	1								1				
CE404.2	2	1										1		
CE404.3	3	2	1							1			1	1
CE404.4	3	2	1									1	1	1
CE404.5	2	1								1			1	1
CE404.6	3	3	2	1								1	1	1
C														

20HS7A2

TOTAL QUALITY MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand TQM concepts.
- To know about TQM principles.
- To understand Six Sigma, Traditional tools, New tools, Benchmarking and FMEA.
- To understand Taguchi's Quality Loss Function, Performance Measures and apply QFD, TPM, COQ and BPR.
- To apply QMS and EMS in any organization.

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION 9

Quality – Need, Evolution, Definitions, Dimensions of product and service quality. TQM - Basic concepts, Framework, Contributions of Deming, Juran and Crosby, Barriers. Quality statements, Customer satisfaction, Customer complaints, Customer retention, Costs of quality.

UNIT-II TQM PRINCIPLES 9

Strategic quality planning, Quality Councils, Employee involvement, Motivation, Empowerment, Teamwork, Quality circles, Recognition and Reward, Performance appraisal, Continuous process improvement - PDCA cycle, 5S, Kaizen, Supplier partnership, Supplier selection, Supplier Rating.

UNIT - III TQM TOOLS AND TECHNIQUES I 9

Traditional tools of quality, New management tools. Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT, Bench marking, Reason to bench mark, Bench marking process, FMEA - Stages, Types.

UNIT - IV TQM TOOLS AND TECHNIQUES II 9

Control Charts, Process Capability, Quality Function Development (QFD), Taguchi quality loss function, TPM - Concepts, improvement needs, Performance measures.

UNIT - V QUALITY SYSTEMS 9

Need for ISO 9000, ISO 9001-2008 Quality System, Elements, Documentation, Quality Auditing, QS 9000 - ISO 14000, Concepts, Requirements and Benefits, TQM Implementation in manufacturing and service sectors.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Dale H. Besterfield, et al., "Total quality Management", Pearson Education Asia, 5th Edition, 2018.
2. James R. Evans and William M. Lindsay, "The Management and Control of Quality", Cengage Learning, 8th Edition, 2012.
3. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2nd Edition, 2006.

REFERENCES:

1. Joel.E. Ross, “Total Quality Management – Text and Cases”, CRC Press, 5th Edition, 2017.
2. Kiran.D.R, “Total Quality Management: Key concepts and case studies, Butterworth – Heinemann Ltd, 1st Edition, 2016.
3. Oakland, J.S. “TQM – Text with Cases”, Butterworth – Heinemann Ltd., Oxford, 3rd Edition, 2012.
4. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 1st Edition, 2006.
5. Brue G, "Six Sigma for Managers", Tata-McGraw Hill, 2nd Edition, 2002.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : TOTAL QUALITY MANAGEMENT						Course Code : 20HS7A2								
CO	Course Outcomes					Unit No	K –CO	POs	PSOs					
C409B5.1	Explain basic concepts, TQM framework, Barriers Benefits of TQM and importance of customers					I	K2	6,8 -12	-					
C409B5.2	Explain the TQM Principles, understand the importance of employee involvement and supplier partnership					II	K2	6,8 -12	-					
C409B5.3	Explain the basics of Six Sigma, Traditional tools, New tools,					III	K2	6,8 -12	-					
C409B5.4	Explain the process of Benchmarking and FMEA.					IV	K2	6,8 -12	-					
C409B5.5	Explain process capability, QFD, TPM, Taguchi quality loss function and performance measures					V	K2	6,8 -12	-					
C409B5.6	Explain the Quality system ISO 9000, ISO 14000, Audit, Certification process and implementation of TQM in manufacturing and service sectors					V	K2	6,7,8-12	-					
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C409B5.1	1				1	2		2	2	2	2	1		
C409B5.2	1				2	2		2	2	2	2	1		
C409B5.3	1				2	2		2	2	2	2	1		
C409B5.4	1				2	2		2	2	2	2	1		
C409B5.5	1				2	2		2	2	2	2	1		
C409B5.6	1				-	2	2	2	2	2	2	1		

SEMESTER VII ELECTIVE III

20CS7B1

C# AND .NET PROGRAMMING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn basic programming in C# and the object oriented programming concepts.
- To update and enhance skills in writing Windows applications, ADO.NET and ASP .NET.
- To study the advanced concepts in data connectivity, WPF, WCF and WWF with C# and .NET 4.5.
- To implement mobile applications using .Net compact framework
- To understand the working of base class libraries, their operations and manipulation of data using XML.

PRE-REQUISITE:NIL

UNIT-I C# LANGUAGE BASICS 9

.Net Architecture – Core C# – Variables – Data Types – Flow control – Objects and Types- Classes and Structs – Inheritance- Generics – Arrays and Tuples – Operators and Casts – Indexers.

UNIT-II C# ADVANCED FEATURES 9

Delegates – Lambdas – Lambda Expressions – Events – Event Publisher – Event Listener – Strings and Regular Expressions – Generics – Collections – Memory Management and Pointers – Errors and Exceptions – Reflection.

UNIT - III BASE CLASS LIBRARIES AND DATA MANIPULATION 9

Diagnostics -Tasks, Threads and Synchronization – .Net Security – Localization – Manipulating XML- SAX and DOM – Manipulating files and the Registry- Transactions – ADO.NET- Peer-to-Peer Networking – PNRP – Building P2P Applications – Windows Presentation Foundation (WPF).

UNIT - IV WINDOW BASED APPLICATIONS, WCF AND WWF 9

Window based applications – Core ASP.NET- ASP.NET Web forms -Windows Communication Foundation (WCF)- Introduction to Web Services – .Net Remoting – Windows Service – Windows Workflow Foundation (WWF) – Activities – Workflows.

UNIT - V .NET FRAMEWORK AND COMPACT FRAMEWORK 9

Assemblies – Shared assemblies – Custom Hosting with CLR Objects – Appdomains – Core XAML – Bubbling and Tunneling Events- Reading and Writing XAML .Net Compact Framework – Compact Edition Data Stores – Errors, Testing and Debugging – Optimizing performance – Packaging and Deployment – Networking and Mobile Devices.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner, Professional C# 2012 and .NET 4.5, Wiley, 2012
2. Harsh Bhasin, Programming in C#, Oxford University Press, 2014.

REFERENCES:

1. Ian Gariffiths, Mathew Adams, Jesse Liberty, Programming C# 4.0, OReilly, Fourth Edition, 2010.
2. Andrew Troelsen, Pro C# 5.0 and the .NET 4.5 Framework, Apress publication, 2012.
3. Andy Wigley, Daniel Moth, Peter Foot, Mobile Development Handbook, Microsoft Press, 2011

Course Name : : C# and .NET Programming		Course Code: 20CS7B1												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
CE405.1	Describe the core syntax and features of C#	1	K2	1, 2, 8, 9	2									
CE405.2	Illustrate in detail about Lambda Expression, Event Listeners, Memory Management and Pointers	2	K3	1, 2, 3, 8, 9	2									
CE405.3	Illustrate file manipulation and ADO.NET using libraries	3	K3	1, 2, 3, 5, 8, 9	2									
CE405.4	Develop a simple form and events handling using ASP.NET	4	K3	1, 2, 3, 5, 8, 9	2									
CE405.5	Make use of CLR for execution of a .NET application	5	K3	1, 2, 3, 5, 8, 9	2									
CE405.6	Compare features of .NET framework and .NET compact framework	5	K2	1, 2, 8, 9	2									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE405.1	2	1						1	1	1				1
CE405.2	3	2	1					1	1	1				1
CE405.3	3	2	1		2			1	1	1				1
CE405.4	3	2	1		2			1	1	1				1
CE405.5	3	2	1		2			1	1	1				1
CE405.6	2	1						1	1	1				1
C	3	2	1		1			1	1	1				1

20CS7B2	WIRELESS ADHOC AND SENSOR NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Understand the design issues in ad hoc and sensor networks.
- Learn the different types of MAC protocols.
- Be familiar with different types of adhoc routing protocols.
- Be expose to the TCP issues in adhoc networks.
- Learn the architecture and protocols of wireless sensor networks.

PRE-REQUISITE:

Course Code :20CS501

Course Name :Computer Networks

UNIT-I INTRODUCTION 9

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs):concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

UNIT-II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS 9

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols: MACAW, Floor acquisition Multiple access Protocol-Contention based protocols with Reservation Mechanisms: Distributed Packet Reservation Multiple Access Protocol, Collision Avoidance Time Allocation Protocol-Contention based protocols with Scheduling Mechanisms: Distributed Priority Scheduling and Medium access Protocol - Multi-channel MAC.

UNIT - III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS 9

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing: DSDV, WRP - Reactive routing: DSR, AODV - Hybrid routing: CEDAR, ZRP- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT - IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS 9

Single node architecture: hardware and software components of a sensor node - WSN Network architecture: typical network architectures-Data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

UNIT - V WSN ROUTING, LOCALIZATION & QOS 9

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.
2. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.

REFERENCES:

1. Feng Zhao And Leonidesguibas, "Wireless Sensor Networks", Elsevier Publication - 2002.
2. Holger Karl And Andreas Willig "Protocols And Architectures For Wireless Sensor Networks", Wiley, 2005
3. Kazem Sohraby, Daniel Minoli, &Taiebznati, "Wireless Sensor Networks-Technology, Protocols, And Applications", John Wiley, 2007.
4. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

Course Name : : Wireless Adhoc And Sensor Networks										Course Code: 20CS7B2				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
CE405.1	Explain the basic concepts of wireless networks and challenges of Adhoc and sensor networks.									1	K2	1, 2, 8, 9	2	
CE405.2	Classify the design issues and different categories of MAC protocols.									2	K2	1, 2, 8, 9	2	
CE405.3	Explain the various Adhoc routing protocols and transport layer mechanisms.									3	K2	1, 2, 8, 9	2	
CE405.4	Discuss the sensor characteristics and Data relaying and aggregation strategies.									4	K2	1, 2, 8, 9	2	
CE405.5	Describe the different WSN MAC layer protocols.									4	K2	1, 2, 8, 9	2	
CE405.6	Illustrate the issues of routing, QoS and Localization related performance measurements in WSN									5	K2	1, 2, 8, 9	2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE405.1	2	1						2	2	1			2	
CE405.2	2	1						2	2	1			2	
CE405.3	2	1						2	2	1			2	
CE405.4	2	1						2	2	1			2	
CE405.5	2	1						2	2	1			2	
CE405.6	2	1						2	2	1			2	
C	2	1						2	2	1			2	

20CS7B3	MULTI-CORE ARCHITECTURES AND PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

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

PRE-REQUISITE:

Course code: 20CS201

Course Name: Programming in C

UNIT-I MULTI-CORE PROCESSORS 9

Single core to Multi-core architectures – SIMD and MIMD systems – Interconnection networks - Symmetric and Distributed Shared Memory Architectures – Cache coherence - Performance Issues – Parallel program design.

UNIT-II PARALLEL PROGRAM CHALLENGES 9

Performance – Scalability – Synchronization and data sharing – Data races – Synchronization primitives (mutexes, locks, semaphores, barriers) – deadlocks and livelocks – communication between threads (condition variables, signals, message queues and pipes).

UNIT - III SHARED MEMORY PROGRAMMING WITH OpenMP 9

OpenMP Execution Model – Memory Model – OpenMP Directives – Work-sharing Constructs - Library functions – Handling Data and Functional Parallelism – Handling Loops - Performance Considerations.

UNIT - IV DISTRIBUTED MEMORY PROGRAMMING WITH MPI 9

MPI program execution – MPI constructs – libraries – MPI send and receive – Point-to-point and Collective communication – MPI derived datatypes – Performance evaluation.

UNIT - V PARALLEL PROGRAM DEVELOPMENT 9

Case studies - n-Body solvers – Tree Search – OpenMP and MPI implementations and comparison.

TOTAL: 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

3. Yan Solihin, Fundamentals of Parallel Multicore Architecture, CRC Press, 2015

Course Name : Multicore Architectures and Programming										Course Code: 20CS7B3				
CO	Course Outcomes										Unit	K-CO	POs	PSOs
CE405.1	Describe multi core architectures and identify their characteristics and performance issues										1	K2	1, 2, 8, 9	1,2
CE405.2	Identify the issues in programming Parallel Processors										2	K2	1, 2, 8, 9	1,2
CE405.3	Illustrate shared memory programs using OpenMP										3	K3	1, 2, 3, 8, 9	1,2
CE405.4	Illustrate distributed memory programs using MPI.										4	K3	1, 2, 3, 8, 9	1,2
CE405.5	Analyze the parallel program implementation of n-Body solvers using OpenMP andMPI programs										5	K4	1, 2, 3,4, 8,9	1,2
CE405.6	Analyze the parallel program implementation of Tree Search problem using OpenMP andMPI programs										5	K4	1, 2, 3,4, 8,9	1,2
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE405.1	2	1						1	1	1			1	1
CE405.2	2	1						1	1	1			1	1
CE405.3	3	2	1					1	1	1			1	1
CE405.4	3	2	1					1	1	1			1	1
CE405.5	3	3	2	1				1	1	1			1	1
CE405.6	3	3	2	1				1	1	1			1	1
C	3	2	1	1				1	1	1			1	1

20CS7B4	DISTRIBUTED SYSTEMS	L	T	P	C
		3	0	0	3
OBJECTIVES:					
•	o learn fundamentals, issues related to clock synchronization and need for global state in distributed systems.				T
•	o learn the concepts of message ordering and snapshot recording algorithms				T
•	o learn about distributed mutual exclusion and deadlock detection algorithms.				T
•	o understand the significance of agreement and recovery protocols in distributed systems.				T
•	o learn the characteristics of peer-to-peer and distributed shared memory systems.				T

PRE-REQUISITE:

Course Code: 20CS404, 20CS402

Course Name :Operating Systems, Database Management Systems

UNIT-I CHARACTERIZATION AND MODEL OF DISTRIBUTED COMPUTATIONS 9

Introduction: Definition–Examples of Distributed Systems–Motivation –Message passing systems versus shared memory systems–Primitives for distributed communication – Synchronous versus asynchronous executions –Design issues and challenges. Trends in Distributed systems: A distributed program –A model of distributed executions –Models of communication networks –Global state of a distributed system– Cuts of a distributed component –Past and future cones of an event –Models of process communications - Logical Time: A framework for a system of logical clocks –Scalar time –Vector time – Virtual time- Physical clock synchronization: NTP

UNIT-II MODEL OF DISTRIBUTED COMPUTATIONS 9

Snapshot algorithms for FIFO channels, Snapshot algorithms for non-FIFO channels, Snapshot algorithm in a causal delivery system ,Necessary and sufficient conditions for consistent global snapshots- Message ordering:Message ordering paradigms – Asynchronous execution with synchronous communication –Synchronous program order on an asynchronous system- Causal order - Total order

UNIT - III MUTUAL EXCLUSION AND DEADLOCK 9

Distributed mutual exclusion algorithms:Lamport’s algorithm – Ricart-Agrawala algorithm – Maekawa’s algorithm – Suzuki–Kasami’s broadcast algorithm - Deadlock detection in distributed systems: Models of deadlocks – Knapp’s classification – Chandy-Mirsa-Hass algorithms for AND model and for OR model.

UNIT - IV CHECK POINTING AND ROLLBACK RECOVERY AND AGREEMENT ALGORITHMS 9

Check pointing and rollback recovery: Issues in failure recovery – Checkpoint-based recovery – Log-based rollback recovery – Koe-Toueg coordinated check pointing algorithm - Agreement algorithms:Agreement in a failure- free system – Agreement in synchronous systems with failures- Agreement in asynchronous message passing systems with failures.

UNIT - V PEER-TO-PEER COMPUTING AND DISTRIBUTED SHARED MEMORY 9

Peer-to-peer computing: Chord distributed hash table- Content addressable networks – Tapestry - Distributed shared memory: Memory consistency models –Shared memory Mutual Exclusion. Wait-Freedom

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Kshemkalyani, Ajay D., and MukeshSinghal. Distributed computing: principles algorithms, and systems.Cambridge University Press, 2011.
2. George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems Concepts and Design, Fifth Edition, Pearson Education, 2012.

REFERENCES:

1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.
2. MukeshSinghal and Niranjan G. Shivaratri. Advanced concepts in operating systems. McGraw-Hill, Inc., 1994.
3. Tanenbaum A.S., Van Steen M., —Distributed Systems: Principles and ParadigmsII, Pearson Education, 2007.
4. Liu M.L., —Distributed Computing, Principles and ApplicationsII, Pearson Education, 2004.
5. Nancy A Lynch, —Distributed AlgorithmsII, Morgan Kaufman Publishers, USA, 2003.

Course Name : Distributed Systems		Course Code: 20CS7B4												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
CE405.1	Outline the issues and challenges in developing distributed applications	1	K2	1, 2, 8,9	1									
CE405.2	Discuss the various features of Global state of a distributed computation	1	K2	1, 2, 8,9	1									
CE405.3	Describe the needs of message ordering and snapshot recording algorithms in distributed computations	2	K2	1, 2, 8,9	1									
CE405.4	Discuss Mutual Exclusion and Deadlock detection algorithms in distributed systems	3	K2	1, 2, 8,9	1									
CE405.5	Explain the agreement algorithms and recovery algorithms in distributed systems.	4	K2	1, 2, 8,9	1									
CE405.6	Describe the popular distributed systems and distributed shared memory techniques	5	K2	1, 2, 8,9	1									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE405.1	2	1						1	1	1			1	
CE405.2	2	1						1	1	1			1	
CE405.3	2	1						1	1	1			1	
CE405.4	2	1						1	1	1			1	
CE405.5	2	1						1	1	1			1	
CE405.6	2	1						1	1	1			1	
C	2	1						1	1	1			1	

20IT7B2

USER INTERFACE DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the basics of User interface.
- To learn the foundations of Human Computer Interaction.
- To be familiar with the web design components such as windows.
- To be aware of Multimedia and Windows layout.

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION 9

Human-Computer Interface – Characteristics Of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles.

UNIT-II HUMAN COMPUTER INTERACTION 9

User Interface Design Process – Obstacles –Usability –Human Characteristics In Design – Human Interaction Speed –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – System Timings – Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus– Contents Of Menu– Formatting – Phrasing The Menu – Selecting Menu Choice– Navigating Menus– Graphical Menus.

UNIT - III WINDOWS 9

Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations– Web Systems– Device– Based Controls Characteristics– Screen – Based Controls – Operate Control – Text Boxes– Selection Control– Combination Control– Custom Control– Presentation Control.

UNIT - IV MULTIMEDIA 9

Text For Web Pages – Effective Feedback– Guidance & Assistance–Internationalization– Accessibility – Icons– Image– Multimedia – Coloring.

UNIT - V WINDOWS LAYOUT- TEST 9

Prototypes – Kinds of Tests – Retest – Information Search – Visualization – Hypermedia – WWW– Software Tools.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Wilbent. O. Galitz, "The Essential Guide To User Interface Design", John Wiley & Sons, Third Edition, 2007.
2. Ben Sheiderman, "Design The User Interface", Pearson Education, 6th Edition, 2021.

REFERENCES:

1. Alan Cooper, "The Essential Of User Interface Design", Wiley – Dream Tech Ltd., 2002.

Course Name : User Interface Design										Course Code: 20IT7B2				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
CE405.1	Explain the characteristics of graphics interface and their principles.									1	K2	1, 2, 8, 9	1,2	
CE405.2	Discuss human characteristics and requirement analysis in user interface design process.									2	K2	1, 2, 8,9,10	1,2	
CE405.3	Illustrate the structure and functions of menus.									3	K3	1, 2,3, 9,10,12	1,2	
CE405.4	Describe the characteristics and various controls in windows.									4	K2	1, 2, 8,9,10,12	1,2	
CE405.5	Discuss the importance of user feedback and multimedia applications.									5	K2	1, 2, 8, 9,10,12	1.2	
CE405.6	Make use of different kinds of tests and visualization techniques for hypermedia and software tools.									5	K3	1, 2,3, 8,9,10,12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE405.1	2	1	-	-	-	-	-	1	1	-	-	-	1	2
CE405.2	2	1	-	-	-	-	-	1	1	-	-	-	1	2
CE405.3	3	2	1	-	-	-	-	1	1	-	-	2	1	2
CE405.4	2	1	-	-	-	-	-	1	1	-	-	2	1	2
CE405.5	2	1	-	-	-	-	-	1	1	-	-	2	1	2
CE405.6	3	2	1	-	-	-	-	1	1	-	-	2	1	2
C														

20IT7B4	SERVICE ORIENTED ARCHITECTURE	L	T	P	C
		3	0	0	3
OBJECTIVES:					
<ul style="list-style-type: none"> • To learn fundamentals of XML • To provide an overview of Service Oriented Architecture and Web services and their importance • To learn web services standards and technologies • To learn service-oriented analysis and design for developing SOA based applications 					
PRE-REQUISITE:					
Course Code: 20CS605					
Course Name: Web Technology					
UNIT-I	XML				9
XML document structure – Well-formed and valid documents – DTD – XML Schema – Parsing XML using DOM, SAX – XPath - XML Transformation and XSL – Xquery.					
UNIT-II	SERVICE ORIENTED ARCHITECTURE (SOA) BASICS				9
Characteristics of SOA, Benefits of SOA, Comparing SOA with Client-Server and Distributed architectures – Principles of Service Orientation – Service layers.					
UNIT - III	WEB SERVICES (WS) AND STANDARDS				9
Web Services Platform – Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Service-Level Interaction Patterns – Orchestration and Choreography. Case Study.					
UNIT - IV	WEB SERVICES EXTENSIONS				9
WS-Addressing - WS-Reliable Messaging - WS-Policy – WS-Coordination – WS - Transactions - WS-Security –SOA support in J2EE - Examples. Case Study.					
UNIT - V	SERVICE ORIENTED ANALYSIS AND DESIGN				9
SOA delivery strategies – Service oriented analysis – Service Modelling – Service oriented design – Standards and composition guidelines -- Service design – Business process design – Case Study.					

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Thomas Erl, "Service Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2007
2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004

REFERENCES:

1. James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, "Java Web Services Architecture", Elsevier, 2003.
2. Ron Schmelzer et al. "XML and Web Services", Pearson Education, 2002.
3. Frank P. Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.

Course Name : Service Oriented Architecture										Course Code: 20IT7B4					
CO	Course Outcomes										Unit	K-CO	POs	PSOs	
CE405.1	Explain the basic concepts of XML, schema and Xquery.										1	K2	1,2,8,9,10	1,2	
CE405.2	Outline the Characteristics of Service oriented architecture and service layers										2	K2	1,2,8,9,10	1,2	
CE405.3	Illustrate the Web services and WS standards for a given application										3	K3	1,2,3,8,9,10,12	1,2	
CE405.4	Illustrate the Web services Policies and coordination for any real time application.										4	K3	1,2,3,8,9,10,12	1,2	
CE405.5	Explain service oriented analysis and service modeling										5	K2	1,2,8,9,10	1,2	
CE405.6	Illustrate service oriented business process design for any given application										5	K3	1,2,3,8,9,10,12	1,2	
CO-PO Mapping															
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CE405.1	2	1	-	-	-	-	-	2	2	1	-	-	3	1	
CE405.2	2	1	-	-	-	-	-	2	2	1	-	-	3	1	
CE405.3	3	2	1	-	-	-	-	2	2	1	-	1	3	1	
CE405.4	3	2	1	-	-	-	-	2	2	1	-	1	3	1	
CE405.5	2	1	-	-	-	-	-	2	2	1	-	-	3	1	
CE405.6	3	2	1	-	-	-	-	2	2	1	-	1	3	1	
C	3	2	1	-	-	-	-	2	2	1	-	1	3	1	

REFERENCES:

1. .Srinivasan, “Operations Research: Principles and Applications”, PHI Ltd., 2016.
2. Kanti swarup Gupta.P.K, Man Muhan” „Operations Research: Sultan Chand & Sons India Ltd., 12th Edition,New Delhi 2016.
3. Philips, Ravindran and Solberg, “Operations Research principle and practise”, John Wiley, 2016.
4. Hiller and Liberman, Introduction to Operations Research, McGraw Hill, 2015.
5. Ramamurthy P, “Operations Research”, New age International Publishers, 2nd edition, 2007.

Course Name : Operations Research						Course Code: 20HS601								
CO	Course Outcomes					Unit	K-CO	POs	PSOs					
CE405.1	Solve Linear Programming Problems by appropriate technique.					1	K3	1, 2,3,8,9,10	1					
CE405.2	Determine the performance characteristics such as time and cost in solving shortest route, transportation problems with an appropriate model.					1	K3	1, 2,3,8,9,10	1					
CE405.3	Solve the given assignment problem with an appropriate method.					2	K3	1, 2,3,8,9,10	1					
CE405.4	Determine the optimal solution for a project scheduling problem.					3	K3	1, 2,3,8,9,10	1					
CE405.5	Determine the order quantity of goods under different constraints.					4	K3	1, 2,3,8,9,10	1					
CE405.6	Determine the solutions to single and multi channel Queuing problems.					5	K3	1, 2,3,8,9,10	1					
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE405.1	3	2	1					1	1	1			1	
CE405.2	3	2	1					1	1	1			1	
CE405.3	3	2	1					1	1	1			1	
CE405.4	3	2	1					1	1	1			1	
CE405.5	3	2	1					1	1	1			1	
CE405.6	3	2	1					1	1	1			1	
C	3	2	1					1	1	1			1	

20CS8A1

SOCIAL NETWORK ANALYSIS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the concept of semantic web and related applications.
- To learn knowledge representation using ontology.
- To understand human behaviour in social web and related communities.
- To learn visualization of social networks.

PRE-REQUISITE:

Course Code :20CS501

Course Name :Computer Networks

UNIT-I INTRODUCTION 9

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 REPRESENTATION 9

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 9

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 BEHAVIOUR AND PRIVACY ISSUES 9

Understanding and predicting human behaviour 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 countermeasures.

UNIT - V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS 9

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.

TOTAL: 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

1. Guandong Xu, Yanchun Zhang and Lin Li, Web Mining and Social Networking – Techniques and applications, First Edition, Springer, 2011.
2. Dion Goh and Schubert Foo, Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively, IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and 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 Name : Social Network Analysis						Course Code: 20CS8A1								
CO	Course Outcomes					Unit	K-CO	POs	PSOs					
CE408.1	Explain the semantic web concepts and applications of social network analysis.					1	K2	1, 2, 8,9	1,2					
CE408.2	Discuss about modeling and knowledge representation using ontology of social network.					2	K2	1, 2, 8,9	1,2					
CE408.3	Illustrate the extraction and mining communities in web social networks.					3	K3	1, 2, 3, 8,9	1,2					
CE408.4	Illustrate the various methods for predicting human behaviour in social communities.					4	K3	1, 2, 3, 8,9	1,2					
CE408.5	Describe the privacy issues in trust network analysis.					4	K2	1, 2, 8,9	1,2					
CE408.6	Make use of visualization techniques for social network applications					5	K3	1, 2, 3, 8,9	1,2					
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE408.1	2	1						1	1	1			2	2
CE408.2	2	1						1	1	1			2	2
CE408.3	3	2	1					1	1	1			2	2
CE408.4	3	2	1			1		1	1	1			2	2
CE408.5	2	1				1		1	1	1			2	2
CE408.6	3	2	1		1			1	1	1			2	2
C	3	2	1		1	1		1	1	1			2	2

20CS8A2 SOFTWARE DEFINED NETWORKS L T P C
3 0 0 3

OBJECTIVES:

- To learn the fundamentals of software defined networks.
- To understand the separation of the data plane and the control plane.
- To study about the SDN Programming.
- To study about the various applications of SDN

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION TO SOFTWARE DEFINED NETWORK 9
 SDN Origins and Evolution – Introduction – Why SDN? - Centralized and Distributed Control and Data Planes - The Genesis of SDN.

UNIT-II OPEN FLOW AND SDN CONTROLLERS 9
 Open Flow Specification – Drawbacks of Open SDN, SDN via APIs, SDN via Hypervisor Based Overlays – SDN via Opening up the Device – SDN Controllers – General Concepts.

UNIT - III DATA CENTERS 9
 Multitenant and Virtualized Multitenant Data Center – SDN Solutions for the Data Center Network – VLANs – EVPN – VxLAN – NVGRE.

UNIT - IV SDN PROGRAMMING 9
 Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs – Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications.

UNIT - V SDN FRAMEWORK 9
 Juniper SDN Framework – IETF SDN Framework – Open Daylight Controller – Floodlight Controller – Bandwidth Calendaring – Data Center Orchestration.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Paul Goransson and Chuck Black, Software Defined Networks: A Comprehensive Approach, First Edition, Morgan Kaufmann, 2014.
2. Thomas D. Nadeau, Ken Gray, SDN: Software Defined Networks, O’Reilly Media, 2013

REFERENCES:

1. SiamakAzodolmolky, Software Defined Networking with Open Flow, Packet Publishing, 2013.
2. Vivek Tiwari, SDN and Open Flow for BeginnersII, Amazon Digital Services, Inc., 2013.
3. Fei Hu, Editor, Network Innovation through Open Flow and SDN: Principles and Design, CRC Press, 2014.

Course Name : Software Defined Networks		Course Code: 20CS8A2												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
CE408.1	Explain the key benefits of SDN by separation of Data and Control Planes.	1	K2	1, 2, 8, 9	1									
CE408.2	Discuss the openflow specification and different controllers of SDN.	2	K2	1, 2, 8, 9	1									
CE408.3	Describe various Data centers and SDN solutions for the Data Center networks.	3	K2	1, 2,8, 9	1									
CE408.4	Develop various applications of SDN using current languages and tools.	4	K3	1, 2, 3, 8, 9	1									
CE408.5	Explain the various concepts of Network function virtualization in SDN programming.	4	K2	1, 2, 8, 9	1									
CE408.6	Explain different framework and controller used in SDN	5	K2	1, 2,8,9	1									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE408.1	2	1						1	1	1			2	
CE408.2	2	1						1	1	1			2	
CE408.3	2	1						1	1	1			2	
CE408.4	3	2	1					1	1	1			2	
CE408.5	3	2						1	1	1			2	
CE408.6	3	2						1	1	1			2	
C	3	2	1					1	1	1			2	

20CS8A3	DIGITAL FORENSICS AND ETHICAL HACKING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn computer forensics
- To become familiar with forensics tools
- To learn to analyze and validate forensics data

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION TO COMPUTER FORENSICS 9

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of forensic techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT-II EVIDENCE COLLECTION AND FORENSICS TOOLS 9

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.

UNIT - III ANALYSIS AND VALIDATION 9

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics.

UNIT - IV ETHICAL HACKING 9

Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats - Sniffing

UNIT - V ETHICAL HACKING IN WEB 9

Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, Computer Forensics and Investigations, Cengage Learning, India Edition, 2016.
2. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015.

REFERENCES:

1. John R.Vacca, Computer Forensics, Cengage Learning, 2005
2. MarjieT.Britz, Computer Forensics and Cyber Crime: An Introduction, 3rd Edition, Prentice Hall, 2013.
3. AnkitFadia, Ethical Hacking, Second Edition, Macmillan India Ltd, 2006
4. Kenneth C.Brancik, Insider Computer Fraud Auerbach Publications Taylor & Francis Group, 2008.

Course Name : : Digital Forensics and Ethical Hacking										Course Code: 20CS8A3				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
CE408.1	Discuss various forensic techniques and computer investigations									1	K2	1, 2, 8, 9	1, 2	
CE408.2	Apply different computer forensic tools to a given scenario									2	K3	1,2,3, 8, 9	1, 2	
CE408.3	Compute and validate forensics data for network, email and mobile devices									3	K3	1,2,3, 8, 9	1, 2	
CE408.4	Explain various ethical hacking techniques in forensics									4	K2	1, 2, 8, 9	1, 2	
CE408.5	Illustrate different hacking methods for web applications									5	K2	1, 2, 8, 9	1, 2	
CE408.6	Demonstrate real world hacking techniques in mobile platform									5	K3	1,2,3, 8, 9	1, 2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE408.1	2	1				3		1	1	1			2	2
CE408.2	3	2	1		3	3		1	1	1		2	2	2
CE408.3	3	2	1			3		1	1	1			2	2
CE408.4	2	1				3		1	1	1			2	2
CE408.5	2	1				3		1	1	1			2	2
CE408.6	3	2	1		3	3		1	1	1	2	2	2	2
C	3	2	1		3	3		1	1	1	1	2	2	2

20CS8A4

SOFT COMPUTING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the basic concepts of Soft Computing
- To become familiar with various techniques like neural networks, genetic algorithms and fuzzy systems.
- To integrate various soft computing techniques for complex problems

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION TO SOFT COMPUTING 9

Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network.

UNIT-II ARTIFICIAL NEURAL NETWORKS 9

Back propagation Neural Networks - Kohonen Neural Network -Learning Vector Quantization -Hamming Neural Network - Hopfield Neural Network- Bi-directional Associative Memory -Adaptive Resonance Theory Neural Networks- Support Vector Machines - Spike Neuron Models.

UNIT - III FUZZY SYSTEMS

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations -Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures - Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.

UNIT - IV GENETIC ALGORITHMS 9

Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction - Inheritance Operators - Cross Over - Inversion and Deletion -Mutation Operator - Bit-wise Operators -Convergence of Genetic Algorithm.

UNIT - V HYBRID SYSTEMS 9

Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination - LR-Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture - Learning in Fuzzy BP- Inference by Fuzzy BP - Fuzzy ArtMap: A Brief Introduction – Soft Computing Tools - GA in Fuzzy Logic Controller Design - Fuzzy Logic Controller.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.
2. S.N.Sivanandam , S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt. Ltd., 2nd Edition, 2011.
3. S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt. Ltd., 2017.

REFERENCES:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2002.
2. Kwang H. Lee, "First course on Fuzzy Theory and Applications", Springer, 2005.
3. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications" Prentice Hall, 1996.
4. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Addison Wesley, 2003.

Course Name : Soft Computing		Course Code: : 20CS8A4												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
CE408.1	Explain the different categories of soft computing techniques	1	K2	1, 2, 8, 9	1									
CE408.2	Illustrate neural networks modeling for different applications	2	K3	1, 2, 3, 8, 9	1									
CE408.3	Apply fuzzy design principles for solving various fuzzy problems	3	K3	1, 2, 3, 8, 9	1									
CE408.4	Explain the different operators and phases of genetic algorithm	4	K2	1, 2, 8, 9	1									
CE408.5	Illustrate the techniques for developing hybrid fuzzy based systems	5	K3	1, 2, 3, 8, 9	1									
CE408.6	Apply different soft computing tools to solve engineering problems	5	K3	1, 2, 3, 8, 9	1									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE408.1	2	1	-	-	-	-	-	2	2	1	-	-	2	
CE408.2	3	2	1	-	-	-	-	2	2	1	-	1	2	
CE408.3	3	2	1	-	-	-	-	2	2	1	-	1	2	
CE408.4	2	1	-	-	-	-	-	2	2	1	-		2	
CE408.5	3	2	1	-	1	1	-	2	2	1	-	1	2	
CE408.6	3	2	1	-	1	1	-	2	2	1	2	1	2	
C	3	2	1	-	1	1	-	2	2	1	1	1	2	

20IT7B1

CYBER PHYSICAL SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the nature of continuous and discrete systems
- To develop synchronous and asynchronous model of processes
- To specify both safety and liveness requirements in temporal logic
- To debug the correctness of the protocol using model checking
- To develop and analyze model of timed and hybrid systems
- To understand zero behaviors and its hybrid automata

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION 9

Introduction-key features of cyber physical systems- Continuous dynamics: Newtonian mechanics- actor models-properties of systems-feedback control-Discrete dynamics: Discrete systems- Finite state machines

UNIT-II SYNCHRONOUS AND ASYNCHRONOUS MODEL 9

Synchronous model: Reactive components-properties of components-composing components- synchronous design, Asynchronous model- asynchronous processes-asynchronous design primitives- coordination protocols.

UNIT - III SAFETY AND LIVENESS REQUIREMENT 9

Safety specifications- verifying invariants- Enumerative search- Temporal logic- Model checking- reachability analysis- proving liveness.

UNIT - IV TIMED MODEL AND REAL-TIME SCHEDULING 9

Timed processes- Timing based protocols: Timing-Based Distributed Coordination-Audio Control Protocol- Timed automata: Model of Timed Automata-Region Equivalence-Matrix-Based Representation for Symbolic Analysis, Real-time scheduling.

UNIT - V HYBRID SYSTEMS 9

Classes of Hybrid Systems-Hybrid dynamic models: Hybrid Processes-Process Composition -Zeno Behaviors-Stability- designing hybrid systems- linear hybrid automata

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Rajeev Alur, Principles of cyber-physical systems, The MIT press, 2015
2. E. A. Lee and S. A. Seshia, Introduction to Embedded Systems - A Cyber-Physical Systems Approach, Lulu.com, Second Edition, 2015.

REFERENCES:

1. Sang C.Suh , U.JohnTanik and John N.Carbone , Applied Cyber-Physical systems, Springer, 2014

Course Name : Cyber Physical Systems										Course Code: 20IT7B1				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
CE408.1	Ability to understand knowledge, opportunities, challenges and Logical Foundations of Cyber Physical Systems.									1	K2	1, 2, 8, 9	1,2	
CE408.2	Ability to develop model for synchronous, asynchronous, continuous and discrete systems.									2	K2	1, 2, 8,9,10	1,2	
CE408.3	Ability to identify safety specifications and critical properties of Cyber Physical Systems.									3	K2	1, 2, 5, 8, 9	1,2	
CE408.4	Ability to design and analyze the stability of hybrid systems.									4	K2	1, 2, 5, 8, 9,10	1,2	
CE408.5	Ability to apply automata for timed systems.									5	K2	1, 2, 5, 8, 9	1.2	
CE408.6	Ability to understand Zeno Behaviors									5	K2	1, 2, 5, 8, 9	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE408.1	2	1			-	-	-	1	1		-	-	1	1
CE408.2	2	1			-	-	-	1	1	1	-	-	1	1
CE408.3	2	1			1	-	-	1	1	-	-	1	1	1
CE408.4	2	1			1	-	-	1	1	1	-	1	1	1
CE408.5	2	1			1	-	-	1	1	-	-	1	1	1
CE408.6	2	1			1			1	1				1	1
C	2	1			1			1	1		1		1	1

20IT8A2

INFORMATION SECURITY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

PRE-REQUISITE:

Course Code: 20CS602

Course Name: Cryptography and Network Security

UNIT-I INTRODUCTION 9

History, What is Information Security?, Critical Characteristics of Information, NSTISSC. Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT-II SECURITY INVESTIGATION 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues -An Overview of Computer Security - Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies

UNIT - III SECURITY ANALYSIS 9

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk - Systems: Access Control Mechanisms, Information Flow and Confinement Problem

UNIT - IV LOGICAL DESIGN 9

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity.

UNIT - V PHYSICAL DESIGN 9

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Michael E Whitman and Herbert J Mattord, —Principles of Information Security, Vikas Publishing House, New Delhi, 5th Edition 2014
2. Micki Krause, Harold F. Tipton, — Handbook of Information Security Management, Vol 1-3 CRCPress LLC, 6th Edition,2007.

REFERENCES:

1. Stuart McClure, Joel Scrambray, George Kurtz, —Hacking Exposed, Tata McGraw-Hill, 2003
2. Matt Bishop, — Computer Security Art and Science, Pearson/PHI, 2005.

Course Name : Information Security		Course Code: 20IT8A2													
CO	Course Outcomes	Unit	K-CO	POs			PSOs								
CE408.1	Discuss the basics of information security	1	K2	1,2,8,9,10,12											
CE408.2	Illustrate the legal, ethical and professional issues in information security	2	K2	1,2,8,9,10,12											
CE408.3	Demonstrate the aspects of risk management.	3	K2	1,2,8,9,10,12											
CE408.4	Aware of various standards in the Information Security System	4	K2	1,2,8,9,10,12			1, 2								
CE408.5	Describe the design and implementation of Security Techniques.	5	K2	1,2,8,9,10,12			1, 2								
CE408.6	Identify the technological aspects of Information Security	5	K2	1,2,8,9,10,12			1, 2								
CO-PO Mapping															
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CE408.1	2	1						2	2	2		2			
CE408.2	2	1						2	2	2		2			
CE408.3	2	1						2	2	2		2			
CE408.4	2	1						2	2	2		2	1	1	
CE408.5	2	1						2	2	2		2	1	1	
CE408.6	2	1						2	2	2		2	1	1	
C	2	1						2	2	2		2	1	1	

20EC8A3

ROBOTICS AND AUTOMATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To study the various parts of robots and fields of robotics.
- To study the various kinematics and inverse kinematics of robots.
- To study the various kinematics and Robot dynamics.
- To study the trajectory planning and control for robot.
- To study the control of robots for some specific applications.

PRE-REQUISITE:NIL

UNIT-I BASIC CONCEPTS OF ROBOTS 9

Introduction of robots, Classification of robots, Present status and future trends. Basic components of robotic system, Mechanisms and transmission, End effectors, Grippers-different methods of gripping, Specifications of robot.

UNIT-II DRIVE SYSTEMS AND SENSORS 9

Drive system- hydraulic, pneumatic and electric systems Sensors in robot – Touch sensors, Tactile sensor, Proximity and range sensors, Robotic vision sensor, Force sensor, Light sensors, Pressure sensors.

UNIT - III KINEMATICS AND DYNAMICS OF ROBOTS 9

2D, 3D Transformation, Scaling, Rotation, Translation, Homogeneous coordinates, multiple transformation, Simple problems. Matrix representation, Forward and Reverse Kinematics Of Three Degree of Freedom, Homogeneous Transformations, Inverse kinematics of Robot, Robot Arm dynamics, Basics of Trajectory Planning.

UNIT - IV ROBOT CONTROL 9

Robot controls-Point to point control, Continuous path control, Intelligent robot, Control system for robot joint, Control actions, Feedback devices, Encoder, Resolver, LVDT, Motion Interpolations, Adaptive control.

UNIT - V ARTIFICIAL INTELLIGENCE IN ROBOTICS 9

Application of Machine learning – AI, Expert systems; Tele-robotics and Virtual Reality, Micro and Nanorobots, Unmanned vehicles, Cognitive robotics, Evolutionary robotics, Humanoids.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Mikell P Groover, Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, July,2017.
2. Craig. J. J. Introduction to Robotics- mechanics and control, Addison- Wesley, fourth edition,2008

REFERENCES:

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009.
2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, PHI Learning., 2009.

Course Name : Robotics And Automation										Course Code: 20EC8A3				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
CE408.1	Explain the basic concepts of Robotics									1	K2	1,2,9,10	1,2	
CE408.2	Classify the various sensors used in robotics									2	K4	1,2,3,4,6,7,9,10,11	1,2	
CE408.3	Explain about the differential kinematic in robotics									2	K2	1,2,7, 8,9,10	1,2	
CE408.4	Illustrate the various dynamics in robotics									3	K4	1,2,3, 4, 6,7,9,10,11	1,2	
CE408.5	Discuss the different controls of Robot									4	K2	1,2, 7, 8,9,10	1,2	
CE408.6	Apply AI in the field of robotics									5	K2	1,2,3, 5, 6,8,9,10,11	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CE408.1	2	1							1	1			2	2
CE408.2	3	3	2	1		1	1		1	1	1		2	2
CE408.3	2	1					1	1	1	1			2	2
CE408.4	3	3	2	1		1	1		1	1	1		2	2
CE408.5	2	1					1	1	1	1			2	2
CE408.6	3	2	1		3	2		1	1	1	1	1	2	2
C	3	2	1			1	1		1	1			2	2

SEMESTER VIII ELECTIVE V

20CS8B1	INFORMATION RETRIEVAL TECHNIQUES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basics of Information Retrieval.
- To understand machine learning techniques for text classification and clustering.
- To understand various search engine system operations.
- To learn different techniques of recommender system.

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION 9

Information Retrieval – Early Developments – The IR Problem – The User’s Task – Information versus Data Retrieval - The IR System – The Software Architecture of the IR System – The Retrieval and Ranking Processes - The Web – The e-Publishing Era – How the web changed Search – Practical Issues on the Web – How People Search – Search Interfaces Today – Visualization in Search Interfaces

UNIT-II MODELING AND RETRIEVAL EVALUATION 9

Basic IR Models - Boolean Model - TF-IDF (Term Frequency/Inverse Document Frequency) Weighting - Vector Model – Probabilistic Model – Latent Semantic Indexing Model – Neural Network Model – Retrieval Evaluation – Retrieval Metrics – Precision and Recall – Reference Collection – User-based Evaluation – Relevance Feedback and Query Expansion – Explicit Relevance Feedback

UNIT - III TEXT CLASSIFICATION AND CLUSTERING 9

A Characterization of Text Classification – Unsupervised Algorithms: Clustering – Naïve Text Classification – Supervised Algorithms – Decision Tree – k-NN Classifier – SVM Classifier – Feature Selection or Dimensionality Reduction – Evaluation metrics – Accuracy and Error – Organizing the classes – Indexing and Searching – Inverted Indexes – Sequential Searching – Multi-dimensional Indexing

UNIT - IV WEB RETRIEVAL AND WEB CRAWLING 9

The Web – Search Engine Architectures – Cluster based Architecture – Distributed Architectures – Search Engine Ranking – Link based Ranking – Simple Ranking Functions – Learning to Rank – Evaluations -- Search Engine Ranking – Search Engine User Interaction – Browsing – Applications of a Web Crawler – Taxonomy – Architecture and Implementation – Scheduling Algorithms – Evaluation.

UNIT - V RECOMMENDER SYSTEM 9

Recommender Systems Functions – Data and Knowledge Sources – Recommendation Techniques – Basics of Content-based Recommender Systems – High Level Architecture – Advantages and Drawbacks of Content-based Filtering – Collaborative Filtering – Matrix factorization models – Neighborhood models.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Ricardo BaezaYates and Berthier RibeiroNeto, Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition, ACM Press Books, 2011.
2. Ricci, F, Rokach, L. Shapira, B.Kantor, Recommender Systems Handbook, First Edition, 2011.

REFERENCES:

1. C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval, Cambridge University Press, 2008.
2. Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.

Course Name : Information Retrieval Techniques										Course Code: 20CS8B1				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C409.1	Explain about the IR components and Web Search Engine Framework									1	K2	1, 2, 8, 9	1,2	
C409.2	Discuss about various information retrieval models									2	K2	1, 2,8,9	1,2	
C409.3	Apply appropriate method of classification or clustering.									3	K3	1, 2, 3, 8,9	1,2	
C409.4	Explain the Web Search Engine architecture and ranking functions									4	K2	1, 2,8,9	1,2	
C409.5	Discuss about Web Link Analysis algorithms and advanced search									4	K2	1, 2,8,9	1,2	
C409.6	Illustrate recommendation techniques and develop content-based Recommender Systems.									5	K4	1, 2, 3,5, 8,9	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C409.1	2	1						1	1			2	2	2
C409.2	2	1						1	1			2	2	2
C409.3	3	2	1					1	1			2	2	2
C409.4	2	1						1	1			2	2	2
C409.5	2	1						1	1			2	2	2
C409.6	3	2	1		1			1	1			2	2	2
C														

20CS8B2

GREEN COMPUTING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the fundamentals of Green Computing.
- To analyze the Green computing Grid Framework.
- To understand the issues related with Green compliance.
- To study and develop various case studies.

PRE-REQUISITE:NIL**UNIT-I FUNDAMENTALS 9**

Green IT Fundamentals: Business, IT and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

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 GRID FRAMEWORK 9

Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

UNIT - IV GREEN COMPLIANCE 9

Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.

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.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Bhuvan Unhelkar, Green IT Strategies and Applications Using Environmental, CRC press, 2011.
2. Intelligence, CRC Press, June 2014. Woody Leonhard, Katherine Murray, Green Home computing for dummies, August 2012.

REFERENCES:

1. Alin Gales, Michael Schaefer, MikeEbbers, Green Data Center: Steps for the Journey, Shroff/IBM, 2018.
2. John Lamb, The Greening of IT, Pearson Education, 2009.
3. Jason Harris, Green Computing and Green IT- Best Practices on regulations & industry, Lulu.com, 2008
4. Carl speshocky, Empowering Green Initiatives with IT, John Wiley & Sons, 2010.
5. Wu Chun Feng (editor), Green computing: Large Scale energy efficiency, CRC Press

Course Name : Green Computing						Course Code: : 20CS8B2								
CO	Course Outcomes					Unit	K-CO	POs		PSOs				
C409.1	Explain the Green IT strategies and its Policies, Practices and Metrics					1	K2	1, 2, 8, 9		1,2				
C409.2	Summarize the green computing practices like Green Enterprise Architecture and modeling					2	K2	1, 2,8,9		1,2				
C409.3	Illustrate energy saving practices and materials recycling					3	K2	1, 2, 3, 8,9		1,2				
C409.4	Explain Green Data center and Green Grid framework					3	K2	1, 2,8,9		1,2				
C409.5	Describe technology tools to ensure Green Compliance and reduce carbon foot print					4	K2	1, 2,8,9		1,2				
C409.6	Analyze and apply green IT strategies and applications to any real world scenario					5	K4	1, 2, 3,5, 8,9		1,2				
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C409.1	2	1				2	2	1	1	2		2	2	2
C409.2	2	1				2	2	1	1	2		2	2	2
C409.3	2	1				2	2	1	1	2		2	2	2
C409.4	2	1				2	2	1	1	2		2	2	2
C409.5	2	1				2	2	1	1	2		2	2	2
C409.6	2	3	2	1		2	2	1	1	2		2	2	2
C	2	2	1	1		2	2	1	1	2		2	2	2

20CS8B3	VIRTUAL REALITY AND AUGMENTED REALITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn rapidly evolving and commercially viable field of computer science.
- To become familiar with geometric modeling and computer graphics.
- To learn various types of Hardware and Software in virtual Reality systems

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION TO VIRTUAL REALITY 9

Virtual Reality and Virtual Environment: Introduction-Computer graphics-Real time computer graphics-Flight Simulation-Virtual environment requirement-benefits of virtual reality-Historical development of VR-Scientific Landmark.

UNIT-II AUGMENTED REALITY 9

Taxonomy-technology and features of augmented reality-difference between AR and VR-Challenges with AR-AR systems and functionality-Augmented reality method-visualization techniques for augmented reality-enhancing interactivity in AR environments-evaluating AR systems.

UNIT - III COMPUTER GRAPHICS AND GEOMETRIC MODELING 9

Introduction-The Virtual world space-positioning the virtual observer-The perspective projection-Human vision-Stereo perspective projection-Colourtheory-Geometrical Transformations-Introduction-frames of reference-Modeling transformations-scaling the VE-Collision detection.

UNIT - IV DEVELOPMENT TOOLS AND FRAMEWORK 9

Human factors-Hardware-Software-The somatic senses-Sensor hardware-Head coupled displays-Acoustic hardware-Integrated VR systems-Modeling virtual world-Physical simulation.

UNIT - V AUGMENTED AND VIRTUAL REALITY APPLICATION 9

Virtual Reality Applications: Introduction – Engineering – Entertainment-Education- The Future: Introduction – Virtual environments – modes of interaction. Case study on Oculus Rift -Head mounted display.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jernej Barbic - Mirabelle D’Cruz Marc Erich Latoschik, Melslater Patrick Bourdot Edition 2017.
2. Timothy Jung M.claudia tom Diek Philip A.Rauschnabel 2019

REFERENCES:

1. Grigore C. Burdea, Philippe Coiffet , Virtual Reality Technology, Wiley 2016
2. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan a. Kaufmann, 2013
3. Alan Craig, William Sherman and Jeffrey Will, Developing Virtual Reality Applications,
4. Foundations of Effective Design, Morgan Kaufmann, 2009.

5. John Vince, "Virtual Reality Systems ", Pearson Education Asia, 2007

Course Name : Virtual Reality And Augmented Reality		Course Code: 20CS8B3												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
C409.1	Explain the Virtual Reality and Environment, Virtual Reality Requirements and benefits	1	K2	1,2,8,9	1,2									
C409.2	Illustrate the visualization techniques for augmented reality	2	K2	1,2,8,9,10	1,2									
C409.3	Discuss the concept of Computer Graphics And Geometric Modeling	3	K2	1,2,8,9	1,2									
C409.4	Use various types of Hardware and software in virtual Reality systems	4	K3	1,2,3,8,9,12	1,2									
C409.5	Apply Development Tools And Framework for Virtual Reality	4	K3	1,2,3,5,6,8,9,12	1,2									
C409.6	Analyze and Design a system or process to meet given specifications with Realistic Engineering Constraints	5	K4	1,2,3,4,5,6,8,9,10,12	1,2									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C409.1	2	1	-	-	-	-	-	1	1	2	-	-	2	3
C409.2	2	1	-	-	-	-	-	1	1	2	-	-	2	3
C409.3	2	1	-	-	-	-	-	1	1	2	-	-	2	3
C409.4	3	2	1	-	-	-	-	1	1	2	-	1	2	3
C409.5	3	2	1	-	2	1	-	2	2	2	-	1	2	3
C409.6	3	3	2	1	1	1	-	2	2	2	-	1	2	3
C	3	2	1	1	1	1	-	1	1	2	-	1	2	3

20CS8B4

BLOCK CHAIN TECHNOLOGY

L	T	P	C
3	0	0	3

OBJECTIVES:

- Comprehend the structure of a Block chain networks.
- Evaluate security issues relating to Block chain and cryptocurrency.
- Design and analyze the applications based on Block chain technology.

PRE-REQUISITE:NIL

UNIT-I	INTRODUCTION TO BLOCKCHAIN	10
History, Digital Money to Distributed Ledgers, Design Primitives, Protocols, Security, Consensus, Permissions, Privacy.		
UNIT-II	BLOCKCHAIN ARCHITECTURE, DESIGN AND CONSENSUS	8
Basic crypto primitives :Hash, Signature, Hash chain to Blockchain, Basic consensus mechanisms, Requirements for the consensus protocols, PoW and PoS, Scalability aspects of Blockchain consensus protocols		
UNIT - III	PERMISSIONED AND PUBLIC BLOCKCHAINS	9
Design goals, Consensus protocols for Permissioned Blockchains, Hyperledger Fabric, decomposing the consensus process, Hyperledger fabric components, Smart Contracts, Chain code design, Hybrid models (PoSandPoW)		
UNIT - IV	BLOCKCHAIN CRYPTOGRAPHY	9
Different techniques for Block chain cryptography, privacy and security of Blockchain, multi-sig concept		
UNIT - V	RECENT TRENDS AND RESEARCH ISSUES IN BLOCKCHAIN	
Scalability, secure cryptographic protocols on Blockchain, multiparty communication, FinTech and Blockchain applicabilities		
		TOTAL: 45 PERIODS

TEXT BOOKS:

1. Andreas Antonopoulos,-Mastering Bitcoin, Programming the Open Blockchain,2017.
2. Melanie Swan,-Blockchain, Blueprint for a new Economy, 1st edition, 2015.

REFERENCES:

1. Jonathan B Morley- That Book on Blockchain: A One-Hour Intro,2017.
2. Daniel Drescher-Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition,2017.

Course Name : Block Chain Technology		Course Code: 20CS8B4												
CO	Course Outcomes	Unit	K-CO	POs	PSOs									
C409.1	Discuss the basic of block chain in terms of protocols and security and privacy	1	K2	1, 2, 8, 9	1, 2									
C409.2	Explain the crypto primitives of block chain architecture	2	K2	1, 2, 8, 9	1, 2									
C409.3	Illustrate the appropriate Consensus design for application protocol	2	K2	1, 2, 8, 9	1, 2									
C409.4	Apply Hyper ledger Fabric to implement the Block chain	3	K3	1, 2, 3, 5,6,8, 9	1, 2									
C409.5	Apply various cryptographic techniques in Block chain cryptography, privacy and security	4	K3	1, 2, 3, 5,6, 8, 9	1, 2									
C409.6	Discuss the research issues of Block chain	5	K2	1, 2, 8, 9	1, 2									
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C409.1	2	1	-	-	-	-	-	1	1	1	-	-	2	3
C409.2	2	1	-	-	-	-	-	1	1	1	-	-	2	3
C409.3	2	1	-	-	-	-	-	1	1	1	-	-	2	3
C409.4	3	2	1	-	1	1	-	1	1	1	-	1	2	3
C409.5	3	2	1	-	1	1	-	1	1	1	-	1	2	3
C409.6	2	1	-	-	-	-	-	1	1	1	-	-	2	3
C	3	2	1	-	1	1	-	1	1	1	-	1	2	3

20IT8B2

SOFTWARE PROJECT MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the Software Project Planning and Evaluation techniques.
- To plan and manage projects at each stage of the software development life cycle (SDLC).
- To learn about the activity planning and risk management principles.
- To manage software projects and control software deliverables.
- To develop skills to manage the various phases involved in project management and people management.
- To deliver successful software projects that support organization’s strategic goals

PRE-REQUISITE:

Course Code: 20CS502

Course Name: Software Engineering

UNIT-I PROJECT EVALUATION AND PROJECT PLANNING 9

Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

UNIT-II PROJECT LIFE CYCLE AND EFFORT ESTIMATION 9

Software process and Process Models – Choice of Process models - mental delivery – Rapid Application development – Agile methods – Dynamic System development Method-Extreme Programming – SCRUM – Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II A Parametric Productivity Model.

UNIT - III ACTIVITY PLANNING AND RISK MANAGEMENT 9

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 patterns – Cost schedules.

UNIT - IV PROJECT MANAGEMENT AND CONTROL 9

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

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham-Hackman job characteristic model – Stress - Healthy and Safety- Ethical and Programmed concerns – Working in teams –Decision making – Organizational Structures - Team structures – Communications genres – Communication plans – Leadership.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.
2. Robert K. Wysocki “Effective Software Project Management” – Wiley Publication,2019

REFERENCES:

1. Walker Royce: "Software Project Management"- Addison-Wesley, 1998.
2. Gopalaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India), Fourteenth Reprint 2017.

Course Name : Software Program Management										Course Code: 20IT8B2				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C409.1	Explain the software project evaluation techniques and planning									1	K2	1,2,8,9,10,12	1,2	
C409.2	Demonstrate different software process models and cost estimation techniques									2	K2	1,2,8,9,10,12	1,2	
C409.3	Illustrate critical path using network planning models in activity planning									3	K3	1,2,3,8,9,10,12	1,2	
C409.4	Outline the different phases of risk management process									4	K2	1,2,8,9,10,12	1,2	
C409.5	Explain the need and framework for project management and control									5	K2	1,2,8,9,10,12	1,2	
C409.6	Summarize the organizational behavior and working in teams									5	K2	1,2,8,9,10,12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C409.1	2	1						2	2	2		2	1	1
C409.2	2	1						2	2	2		2	1	1
C409.3	3	2	1					2	2	2		2	1	1
C409.4	2	1						2	2	2		2	1	1
C409.5	2	1						2	2	2		2	1	1
C409.6	2	1						2	2	2		2	1	1
C	2	1	1					2	2	2		2	1	1

20HS6A1

INTELLECTUAL PROPERTY RIGHTS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To get an adequate knowledge on patent and copyright for their innovative research works.
- To use in their career, information in patent documents provide useful insight on novelty of their idea from state-of-the art search. This provide further way for developing their idea or innovations.
- To pave the way to catch up Intellectual Property (IP) as a career option.
 - R & D IP Counsel
 - Government Jobs – Patent Examiner
 - Private Jobs
 - Patent agent and Trademark agent
 - Entrepreneur

PRE-REQUISITE:NIL**UNIT-I OVERVIEW OF INTELLECTUAL PROPERTY 9**

Introduction and the need for intellectual property right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design - Genetic Resources and Traditional Knowledge - Trade Secret - IPR in India: Genesis and development - IPR in abroad - Major International Instruments concerning Intellectual Property Rights: Paris Convention - 1883, the Berne Convention - 1886, the Universal Copyright Convention - 1952, the WIPO Convention - 1967, the Patent Co-operation Treaty - 1970, the TRIPS Agreement - 1994.

UNIT-II PATENTS 9

Patents - Elements of Patentability: Novelty, Non Obviousness (Inventive Steps), Industrial Application - Non-Patentable Subject Matter - Registration Procedure - Rights and Duties of Patentee - Assignment and license - Restoration of lapsed Patents - Surrender and Revocation of Patents - Infringement - Remedies & Penalties - Patent office and Appellate Board.

UNIT - III COPYRIGHTS 9

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 license of copyright - Infringement - Remedies & Penalties - Related Rights - Distinction between related rights and copyrights.

UNIT - IV TRADEMARKS 9

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 - Infringement, Remedies & Penalties - Trademarks registry and appellate board.

UNIT - V OTHER FORMS OF IP & REGISTRATION PROCESS 9

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. IPR registration process through government website-modalities and publications. Plant Variety Protection: meaning and benefit sharing and farmers’ rights – Procedure for registration, effect of registration and term of protection. Layout Design Protection: meaning – Procedure for registration, effect of registration and term of protection.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. K.V.Nithyananda, “Intellectual Property Rights: Protection and Management”, Cengage Learning India Pvt. Ltd., 2019.
2. P.Neeraj and D.Khusdeep, “Intellectual Property Rights”, PHI Learning Pvt. Ltd., 2014.

REFERENCES:

1. V.K.Ahuja, “Law Relating to Intellectual Property Rights”, Lexis Nexis, Third Edition, 2017.
2. Journal of Intellectual Property Rights (JIPR): NISCAIR
3. Cell for IPR Promotion and Management (<http://cipam.gov.in/>)
4. World Intellectual Property Organization (<https://www.wipo.int/about-ip/en/>)
5. Office of the Controller General of Patents, Designs & Trademarks (<http://www.ipindia.nic.in/>)

Course Name : Intellectual Property Rights										Course Code: 20HS6A1				
CO	Course Outcomes										Unit	K-CO	POs	PSOs
C409.1	Explain the fundamental aspects of Intellectual property Rights which plays a major role in development and management of innovative projects in industries.										1	K2	1,2,8	1,2
C409.2	Describe the patents, patent regime in India and abroad and registration aspects.										2	K2	1,2,8	1,2
C409.3	Describe the copyrights and its related rights and registration aspects.										3	K2	1,2,8	1,2
C409.4	Explain the trademarks and registration aspects.										4	K2	1,2,8	1,2
C409.5	Explain the Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects.										5	K2	1,2,8	1,2
C409.6	Analyze the current trends in IPR and Government steps in fostering IPR										5	K3	1,2,3,8	1,2
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C409.1	2	1				1	1	2	2	2			1	1
C409.2	2	1				1	1	2	2	2			1	1
C409.3	2	1				1	1	2	2	2			1	1
C409.4	2	1				1	1	2	2	2			1	1
C409.5	2	1				1	1	2	2	2			1	1
C409.6	2	1				1	1	2	2	2			1	1

C	2	1				1	1	2	2	2			1	1
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20HS8B2

ECONOMICS FOR ENGINEERS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the fundamental economic concepts
- To understand cost estimation concepts
- To understand value engineering
- To understand project appraisal and methods of analysis
- To understand the methods of depreciation

PRE-REQUISITE:NIL**UNIT-I INTRODUCTION TO ECONOMICS 9**

Introduction to Economics- Flow in an economy, Law of supply and demand, Concept of Engineering Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics – Element of costs, Marginal cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-even analysis - V ratio, Elementary economic Analysis – Material selection for product Design selection of a product, Process planning.

UNIT-II COST ESTIMATION AND MACRO ECONOMICS 9

Cost and revenue concepts- Determination of equilibrium price under perfect competition - Banking – Inflation - National Income.

UNIT - III VALUE ENGINEERING 9

Make or buy decision, Value engineering – Function, aims, Value engineering procedure: Interest formulae and their applications –Time value of money, Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present worth factor- equal payment series capital recovery factor - Uniform gradient series annual equivalent factor, Effective interest rate, Examples in all the methods.

UNIT - IV PROJECT APPRAISAL AND ANALYSIS 9

Methods of comparison of alternatives – present worth method (Revenue dominated cash flow diagram), Future worth method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), Annual equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram),rate of return method, Examples in all the methods.

UNIT - V DEPRECIATION 9

Depreciation- Introduction, Straight line method of depreciation, declining balance method of depreciation-Sum of the years digits method of depreciation, sinking fund method of depreciation/ Annuity method of depreciation, service output method of depreciation-Evaluation of public alternatives- introduction, Examples, Inflation adjusted decisions – procedure to adjust inflation, Examples on comparison of alternatives and determination of economic life of asset.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Panneer Selvam, R, "Engineering Economics", Prentice Hall of India Ltd, New Delhi,2001.

REFERENCES:

1. Chan S.Park, "Contemporary Engineering Economics", Prentice Hall of India, 2011.
2. Donald G. Newman, Jerome P. Lavelle, "Engineering Economics and analysis" Engg. Press, Texas, 2010.
3. Degarmo, E.P., Sullivan, W.G and Canada, J.R, "Engineering Economy", Macmillan, New York, 2011.
4. Zahid Akhan: Engineering Economy, "Engineering Economy", Dorling Kindersley, 2012

Course Name : Economics For Engineers						Course Code: 20HS8B2								
CO	Course Outcomes					Unit	K-CO	POs	PSOs					
C409.1	Describe the concept of engineering economics					1	K2	1,2,8	1,2					
C409.2	Comprehend macroeconomic principles					2	K2	1,2,8	1,2					
C409.3	Decision making in diverse business set up					3	K2	1,2,8	1,2					
C409.4	Explain the Inflation & Price Change					3	K2	1,2,8	1,2					
C409.5	Explain Present Worth Analysis					4	K2	1,2,8	1,2					
C409.6	Apply the principles of economics through various case studies					5	K3	1,2,3,8	1,2					
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C409.1	2	1				1	1	2	2	2			1	1
C409.2	2	1				1	1	2	2	2			1	1
C409.3	2	1				1	1	2	2	2			1	1
C409.4	2	1				1	1	2	2	2			1	1
C409.5	2	1				1	1	2	2	2			1	1
C409.6	2	1				1	1	2	2	2	2		1	1
C	2	1				1	1	2	2	2	1		1	1

SEMESTER V – OPEN ELECTIVE

20OE401	FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the various characteristics of Intelligent agents
- To learn the different search strategies in AI
- To learn to represent knowledge in solving AI problems
- To understand the different ways of designing software agents
- To know about the various applications of AI

PRE-REQUISITE:NIL**UNIT-I INTRODUCTION 9**

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

UNIT-II PROBLEM SOLVING METHODS 9

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search - Game Playing – Optimal Decisions in Games – Alpha - Beta Pruning - Stochastic Games.

UNIT - III KNOWLEDGE REPRESENTATION 9

First Order Predicate Logic– Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering-Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information.

UNIT - IV SOFTWARE AGENTS 9

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

UNIT - V APPLICATIONS 9

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2009.
2. I. Bratko, "Prolog: Programming for Artificial Intelligence", Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

REFERENCES:

1. M. Tim Jones, "Artificial Intelligence: A Systems Approach(Computer Science)", Jones and Bartlett Publishers, Inc., First Edition, 2008
2. Nils J. Nilsson, "The Quest for Artificial Intelligence", Cambridge University Press,2009.
3. William F. Clocksin and Christopher S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003.
4. Gerhard Weiss, "Multi Agent Systems", Second Edition, MIT Press, 2013.
5. David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, 2010.

Course Name : Fundamentals Of Artificial Intelligence										Course Code: 20OE401				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
COE305.1	Explain the problem solving approaches to AI problems									1	K2	1,2,8,9,12	1,2	
COE305.2	Apply appropriate search algorithms for any AI problems									2	K3	1,2,3,8,9,10	1,2	
COE305.3	Solve a problem using first order and predicate logic									3	K3	1,2,3,8,9,10	1,2	
COE305.4	Describe the concepts of software agents									4	K2	1,2,8,9	1,2	
COE305.5	Discuss the software agents for solving AI problems									4	K2	1,2,8,9	1,2	
COE305.6	Describe the applications for Natural Language Processing									5	K2	1,2,1,8,9,10,12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
COE305.1	2	1	-	-	-	-	-	1	1	-	-	1	2	2
COE305.2	3	2	1	-	-	-	-	1	1	1	-	-	2	2
COE305.3	3	2	1	-	-	-	-	1	1	1	-	-	2	2
COE305.4	2	1	-	-	-	-	-	1	1	-	-	-	2	2
COE305.5	2	1	-	-	-	-	-	1	1	-	-	-	2	2
COE305.6	3	2	1	-	-	-	-	1	1	1	-	1	2	2
COE305	3	2	1	-	-	-	-	1	1	1	-	1	2	2

20OE402	INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamentals of data models and to depict a database system using ER diagrams
- To study relational database and to write SQL queries to store/retrieve data to/from database
- To understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures for real time applications
- To understand working procedures of query processing and query optimization techniques
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design
- To study concepts of advanced databases

PRE-REQUISITE:NIL

UNIT-I DATABASE FUNDAMENTALS 8

Purpose of Database System – Views of data – Database System Architecture – Introduction to Data Models –Introduction to Relational Model – Constraints – keys – Entity Relationship Model – Entity Sets – Attributes - Extended E-R features – ER reduction to Relational Schemas.

UNIT-II RELATIONAL DATABASE 10

Structure of Relational Database –SQL Fundamentals – Basic Queries – Set Operations – Aggregate Functions – Clauses – Subqueries – Correlated Subqueries – Joins – Views – Authorization – Advanced SQL – Triggers – Cursors – Procedure – Functions – Embedded SQL – Dynamic SQL

UNIT - III 9

Need for Database Design – Functional Dependencies – Closure of Functional Dependencies – Attribute Closure – Dependency Preservation – Decomposition – Canonical Cover – First Normal Form – Second Normal Form – Third Normal Form – Second Normal Form – Third Normal Form – Boyce Codd Normal Form – Multivalued Dependencies - Fourth Normal Form – Join Dependencies – Fifth Normal Form.

UNIT - IV TRANSACTIONS 9

Transaction Concepts – ACID properties – Transaction States – Serializability – Conflict Serializability – View Serializability – Concurrency Control – Lock Based Protocols – Deadlocks – Time Based Protocols – Stamp Based Protocols – Validation Based Protocols – Recovery System,

UNIT - V STORAGE AND QUERY PROCESSING 9

RAID – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for SELECT and JOIN operations.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, Tata McGraw Hill, 2019.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2016.

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

Course Name : Introduction To Database Management Systems										Course Code: 20OE402				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
COE305.1	Explain the fundamental elements of relative database management systems.									1	K2	1,2	1,2	
COE305.2	Formulate SQL queries for the given relational tables.									2	K2	1,2,8,9,10	1,2	
COE305.3	Apply normal forms to identify the redundancy in database tables.									3	K3	1,2,3,8,9,10	1,2	
COE305.4	Explain various protocols in transaction processing.									4	K2	1,2,8,9,10,12	1,2	
COE305.5	Discuss file organization in database storage system.									5	K2	1,2,8,9,10,12	1,2	
COE305.6	Apply algorithms for SELECT and JOIN operations.									5	K3	1,2,3,8,9,10,12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
COE305.1	2	1	-	-	-	-	-	-	-	-	-	-	2	1
COE305.2	2	1	-	-	-	-	-	1	1	1	-	-	2	1
COE305.3	3	2	1	-	-	-	-	1	1	1	-	-	2	1
COE305.4	2	1	-	-	-	-	-	1	1	1	-	1	2	1
COE305.5	2	1	-	-	-	-	-	1	1	1	-	1	2	1
COE305.6	3	2	1	-	-	-	-	1	1	1	-	1	2	1
COE305	3	1	1	-	-	-	-	1	1	1	-	1	2	1

20OE403	COMPUTER COMMUNICATION NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the protocol layering and physical level communication.
- To analyze the performance of a network.
- To understand the various components required to build different networks.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer.

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION AND PHYSICAL LAYER 9

Networks – Network Types – Classification of computer Networks LAN, WAN, MAN, Network Topology: BUS, STAR, RING, MESH- Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Transmission media – Switching – Circuit Switching, Packet Switching.

UNIT-II DATA-LINK & MEDIA ACCESS LAYER 9

Introduction – Link Layer Addressing – Framing, Physical Addressing, Flow control-noisy and noiseless channels, Error Control – Error detection and Error correction codes- Access control ALOHA,CSMA,CSMA/CD,TDMA,FDMA- Ethernet - Wireless LANs -IEEE 802.11, Bluetooth – Connecting Devices.

UNIT - III NETWORK LAYER 9

Network Layer Services – Performance – Logical Addressing- IPV4,IPV6- Network Layer Protocols- IP, ICMP,IGMP – Unicast Routing Algorithms - Distance Vector, Link state algorithms, Multicasting Basics Routing.

UNIT - IV TRANSPORT LAYER 9

Introduction – Transport Layer Protocols-. TCP, UDP – Services – Port Numbers -Flow control-TCP congestion control, Congestion avoidance mechanisms, Quality of service.

UNIT - V APPLICATION LAYER 9

WWW and HTTP– FTP – Email –Telnet –SSH – DNS.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Behrouz A. Forouzan, “Data Communications and Networking”, Fifth Edition TMH, 2013.
2. William Stallings, “Data and Computer Communications”, Tenth Edition, Pearson Education, 2013

REFERENCES:

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. Nader F. Mir, “Computer and Communication Networks”, Second Edition, Prentice Hall, 2014.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, “Computer Networks: An Open Source Approach”, McGraw Hill Publisher, 2011.
4. James F. Kurose, Keith W. Ross, “Computer Networking, A Top-Down Approach

Featuring the Internet”, Sixth Edition, Pearson Education, 2013.

Course Name : Computer Communication Networks							Course Code: 20OE403							
CO	Course Outcomes						Exp. No	K-CO	POs	PSOs				
COE305.1	Explain the basic concepts of communication networks						1	K2	1,2	1,2				
COE305.2	Apply the error detection and error correction methods for bit streams						2	K3	1,2,3,8,9,10	1,2				
COE305.3	Classify various media access control protocols techniques of communication networks						2	K2	1,2,8,9,10,12	1,2				
COE305.4	Utilize various types of routing techniques to forward packets						3	K2	1,2,8,9	1,2				
COE305.5	Illustrate the mechanisms involved in transport layer						4	K2	1,2,8,9,10	1,2				
COE305.6	Classify different application layer protocols						5	K2	1,2,8,9,10,12	1,2				
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
COE303.1	2	1	-	-	-	-	-	-	-	-	-	-	2	1
COE303.2	3	2	1	-	-	-	-	1	1	1	-	-	2	1
COE303.3	2	1	-	-	-	-	-	1	1	1	-	1	2	1
COE303.4	2	1	-	-	-	-	-	1	1	-	-	-	2	1
COE303.5	2	1	-	-	-	-	-	1	1	1	-	-	2	1
COE303.6	2	1	-	-	-	-	-	1	1	1	-	1	2	1
COE303	2	1	1	-	-	-	-	1	1	1	-	1	2	1

20OE404	CLOUD INFRASTRUCTURE AND TECHNOLOGIES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn about the concept of cloud and utility computing.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION TO CLOUD COMPUTING 9

Introduction to Cloud Computing – Roots of Cloud Computing – Desired Features of Cloud Computing – Challenges and Risks – Benefits and Disadvantages of Cloud Computing.

UNIT-II VIRTUALIZATION 9

Introduction to Virtualization Technology – Load Balancing and Virtualization – Understanding Hypervisor – Seven Layers of Virtualization – Types of Virtualization – Server, Desktop, Application Virtualization.

UNIT - III CLOUD ARCHITECTURE, SERVICES AND STORAGE 9

NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - IaaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage.

UNIT - IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD 9

Inter Cloud Resource Management – Resource Provisioning Methods – Security Overview – Cloud Security Challenges – Data Security –Application Security – Virtual Machine Security.

UNIT - V CASE STUDIES 9

Google App Engine(GAE) – GAE Architecture – Functional Modules of GAE – Amazon Web Services(AWS) – GAE Applications – Cloud Software Environments – Eucalyptus – Open Nebula – Open Stack.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Buyya R., Broberg J., Goscinski A., “Cloud Computing: Principles and Paradigm”, First Edition, John Wiley & Sons, 2011.
2. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
3. Rittinghouse, John W., and James F. Ransome, “Cloud Computing: Implementation, Management, and Security”, CRC Press, 2017

REFERENCES:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, "Mastering Cloud Computing", Tata Mcgraw Hill, 2013.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach", Tata Mcgraw Hill, 2009.
3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice)", O'Reilly, 2009.

Course Name : Cloud Infrastructure And Technologies										Course Code: 20OE404				
CO	Course Outcomes									Exp. No	K-CO	POs	PSOs	
COE304.1	Explain the main concepts, key technologies, strengths and limitations of cloud computing.									1	K2	1,2	1,2	
COE304.2	Describe the key and enabling technologies that help in the development of cloud.									2	K2	1,2,8,9	1,2	
COE304.3	Discuss and use the architecture of compute and storage cloud with its service and delivery models.									3	K2	1,2,8,9	1,2	
COE304.4	Explain the core issues of cloud computing such as resource management and security.									4	K2	1,2,8,9,10,12	1,2	
COE304.5	Discuss the Cloud Environment using current cloud technologies									4	K2	1,2,8,9,10,12	1,2	
COE304.6	Illustrate the appropriate technologies, algorithms and approaches for implementation and use of cloud									5	K3	1,2,3,8,9,10,12	1,2	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
COE304.1	2	1	-	-	-	-	-	-	-	-	-	-	1	2
COE304.2	2	1	-	-	-	-	-	1	1		-	-	1	2
COE304.3	2	1	-	-	-	-	-	1	1		-	-	1	2
COE304.4	2	1	-	-	-	-	-	1	1	1	-	1	1	2
COE304.5	2	1	-	-	-	-	-	1	1	1	-	1	1	2
COE304.6	3	2	1	-	-	-	-	1	1	1	-	1	1	2
COE304	2	1	1	-	-	-	-	1	1	1	-	1	1	2

SEMESTER VII – OPEN ELECTIVE

20OE405	MACHINE LEARNING TECHNIQUES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide a broad survey of different machine learning approaches and techniques
- To understand the principles and concepts of machine learning
- To understand neural networks concepts
- To learn regression and reinforcement learning
- To develop programming skills that helps to build real world applications based on machine learning

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION 9

Introduction: Machine learning: What and why? - Types of Machine Learning - Supervised Learning -Unsupervised Learning - The Curse of dimensionality - Over and under fitting - Model selection - Error analysis and validation - Parametric vs. non-parametric models.

UNIT-II CLASSIFICATION 9

Types of Machine Learning - Supervised Learning - Classification models - Naïve Bayes Classifier – Decision trees - Support Vector Machines - KNN model - Dimensionality reduction - PCA.

UNIT - III CLUSTERING 9

Clustering approaches - Mean Shift clustering - Clustering data points and features - Bi-clustering - Multi-view clustering - K-Means clustering - K-medians clustering - Expectation Maximization (EM).

UNIT - IV REGRESSION 9

Linear models for regression - Ridge Regression - Bayesian linear regression - Logistic models for regression - Bayesian logistic Regression- Reinforcement Learning.

UNIT - V ARTIFICIAL NEURAL NETWORKS 9

Neural networks - Biological motivation for Neural Network - Neural network Representation - Perceptron – Feed forward networks - Multilayer Networks and Back Propagation Algorithms - Hidden layer representation – Application of neural network.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012.
2. Ethem Alpaydin, “Introduction to Machine Learning”, Second Edition, Prentice Hall of India, 2010.

REFERENCES:

1. Laurene Fausett, “Fundamentals of Neural Networks, Architectures, Algorithms and Applications”, Pearson Education, 2008.
2. Tom Mitchell, “Machine Learning”, McGraw-Hill, 1997.
3. C. M. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2007.
- 4.

Course Name : Machine Learning Techniques										Course Code: 20OE405				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
CO1	Discuss the principles and concepts of machine learning and different approaches and techniques									1	K2	1, 2, 8, 9		
CO2	Illustrate different classification techniques for various data sets									2	K3	1,2,3,8,9, 12		
CO3	Utilize clustering approaches for implementing unsupervised learning on data sets									3	K3	1,2,3,8,9, 12		
CO4	Make use of regression models based on supervised learning for data prediction									4	K3	1,2,3,8,9, 12		
CO5	Build an appropriate neural network for learning features in a given data set									5	K3	1,2,3,5,6,8,9, 12		
CO6	Apply neural network for solving real world machine learning problems									5	K3	1,2,3,5,6,8,9, 12		
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	1	1	1	-	-		
CO2	3	2	1	-	-	-	-	1	1	1	-	1		
CO3	3	2	1	-	-	-	-	1	1	1	-	1		
CO4	3	2	1	-	-	-	-	1	1	1	-	1		
CO5	3	2	1	-	1	1	-	1	1	1	-	1		
CO6	3	2	1	-	1	1	-	1	1	1	2	1		
C	3	2	1	-	1	1	-	1	1	1	1	1		

20OE406

JAVA SCRIPT PROGRAMMING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand Definition, Evolution and Nature of JavaScript
- To understand the basics of Script Writing
- To Learn Java Script Names, Objects, and Methods
- To Create Dynamic Web Pages
- To understand the method of Adding Interactivity to a Web Page.

PRE-REQUISITE:NIL

UNIT-I JAVA SCRIPT BASICS 9

JAVA Script Basics: An introduction to JavaScript– Advantages & Limitations of Java Script. Syntax, Variables, Variable Naming Rules and JavaScript Data Types, Expressions and Operators, Flow Control.

UNIT-II OBJECTS AND ARRAYS 9

Creating objects, Object Attributes, Serializing Object, Object Methods Represent Multiple values in Java Script, JavaScript DOM, Arrays: Creating Arrays, Array elements, Multi dimensional Arrays, Array Methods , Functions and Methods.

UNIT - III ADDING INTERACTIVITY TO A WEB PAGE 9

Controlling Script Flow, Storing Tasks within Functions, Using Conditional Statements for Decision Making, if Statements, if-else Conditional Statements, Using the Date Object, for Conditional Statements, while Conditional Statements, break and continue Statements, with Statements, Creating Functions in JavaScript, Declaring a Function, Designing a Simple Function.

UNIT - IV CLIENT SIDE JAVASCRIPT 9

Embedding Java Script in HTML, Execution of JS Program, Dialog boxes, Error Handling & Exceptions. Event Handling: Types of Events, Event Handlers, Document load Events, Mouse Events, Keyboard Events, Drag and Drop Events, Text Events.

UNIT - V JAVA SCRIPT VALIDATION 9

Working with Forms: Accessing the form element, The form object, Accessibility, Validation, Using form-based navigation, Form widgets in libraries and HTML5. Errors and Exceptions, Form Validation, Validation-Built-in objects-Event Handling, DHTML with JavaScript.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. David Flanagan JavaScript: The Definitive Guide, 6th Edition, O'Reilly, 2011
2. David Sawyer McFarland JavaScript & jQuery: The Missing Manual 3rd Edition, 2014

REFERENCES:

1. Marijn Haverbeke Eloquent JavaScript 3rd Edition, No Starch Press, 2018
2. Michael Moncur Teach yourself Java Script in 24 Hours SAMS

Publication 2007

Course Name : Java Script Programming										Course Code: 20OE406				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
CO1	Summarize various java script components like data types, expressions, operators etc.									1	K2	1, 2, 8, 9		
CO2	Discuss the various JavaScript elements, methods, properties, functions and objects									2	K2	1, 2, 8, 9		
CO3	Apply appropriate user experience and interactive design concepts to custom websites									3	K3	1, 2, 3,8, 9,12		
CO4	Apply the event handling methods in client side scripting									4	K3	1, 2, 3,8, 9,12		
CO5	Develop interactive web pages using HTML5 and media tags.									5	K3	1, 2, 3, 5,8,9,12		
CO6	Demonstrate HTML5 integration with JavaScript scripting skills in a variety of student designed projects									5	K3	1,2,3,5,8,9, 10,11,12		
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	1	1	1	-	-		
CO2	2	1	-	-	-	-	-	1	1	1	-	-		
CO3	3	2	1	-	-	-	-	1	1	1	-	1		
CO4	3	2	1	-	-	-	-	1	1	1	-	1		
CO5	3	2	1	-	1	-	-	1	1	1	-	1		
CO6	3	2	1	-	1	-	-	1	1	2	2	1		
C	3	2	1	-	1	-	-	1	1	2	1	1		

20OE407

COMPUTER GRAPHICS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To Gain knowledge about graphics hardware devices and software used.
- To Understand the two dimensional graphics and their transformations.
- To Understand the three dimensional graphics and their transformations.
- Appreciate illumination and color models.
- Be familiar with understand animation techniques

PRE-REQUISITE:NIL

UNIT-I INTRODUCTION 9

Survey of computer graphics, Overview of graphics systems – Video display devices, Raster scan systems, Random scan systems, Graphics monitors and Workstations, Input devices, Hard copy Devices, Graphics Software; Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms.

UNIT-II TWO DIMENSIONAL GRAPHICS 9

Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; widow-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations – point, line, and polygon clipping algorithms.

UNIT - III THREE DIMENSIONAL GRAPHICS 9

Three dimensional concepts; Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations - Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces - B-Spline curves and surfaces. TRANSFORMATION AND VIEWING: Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations; Three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping.

UNIT - IV ILLUMINATION AND COLOUR MODELS 9

Light sources - basic illumination models – halftone patterns and dithering techniques; Properties of light - Standard primaries and chromaticity diagram; Intuitive colour concepts - RGB colour model - YIQ colour model - CMY colour model - HSV colour model - HLS colour model; Colour selection.

UNIT - V ANIMATIONS & REALISM 9

Animation Graphics: Design of Animation sequences – animation function – raster animation –key frame systems – motion specification –morphing – tweening. Computer Graphics Realism: Tiling the plane – Recursively defined curves – Koch curves – C curves – Dragons – space filling curves – fractals – Grammar based models – fractals – turtle graphics – ray tracing.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. John F. Hughes, Andries Van Dam, Morgan Mc Guire ,David F. Sklar , James D. Foley, StevenK. Feiner and Kurt Akeley, Computer Graphics: Principles and Practice”, 3rd Edition, Addison-Wesley Professional, 2013.
2. Donald Hearn and Pauline Baker M, “Computer Graphics”, Prentice Hall, New Delhi, 2007

REFERENCES:

1. Donald Hearn and M. Pauline Baker, Warren Carithers,“Computer Graphics With Open GL”,4th Edition, Pearson Education, 2010.
2. Jeffrey McConnell, “Computer Graphics: Theory into Practice”, Jones and Bartlett Publishers, 2006.
3. Hill F S Jr., "Computer Graphics", Maxwell Macmillan”, 1990.
4. Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, Kelvin Sung, and AK Peters, Fundamental of Computer Graphics, CRC Press, 2010

Course Name : Computer Graphics						Course Code: 20OE407								
CO	Course Outcomes					Unit	K-CO	POs	PSOs					
CO1	Explain the hardware devices and software used in graphics systems.					1	K2	1, 2, 8,9						
CO2	Apply two dimensional graphics and transformation					2	K3	1, 2, 3, 8,9						
CO3	Apply three dimensional graphics and transformation					3	K3	1, 2, 3, 8,9						
CO4	Demonstrate the clipping techniques to graphics.					2,3	K3	1, 2, 3,8,9						
CO5	Discuss about basic illumination and colour models.					4	K2	1, 2, 8,9						
CO6	Explain the animation sequences and various methods in graphics realism					5	K2	1, 2, 8,9						
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1						1	1	1				
CO2	3	2	1					1	1	1				
CO3	3	2	1					1	1	1				
CO4	3	2	1					1	1	1				
CO5	2	1						1	1	1				
CO6	2	1						1	1	1				
C	3	2	1					1	1	1				

REFERENCES:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, Second Edition, 2007.
2. Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
3. Richard Cotton, "Learning R – A Step-by-step Function Guide to Data Analysis, ,O'Reilly Media, 2013.
4. Jiawei Han, Micheline Kamber and Jian Pei - Data Mining: Concepts and Techniques", Third Edition, ISBN 0123814790,

Course Name : Essentials Of Data Analytics										Course Code: 20OE408				
CO	Course Outcomes										Unit	K-CO	POs	PSOs
CO1	Explain the basic concepts of Data Analytic.										1	K2	1, 2,8,9	
CO2	Describe the Data Analysis preprocessing Techniques.										2	K2	1, 2, 8,9	
CO3	Explain about how missing data will be handled during preprocessing.										2	K2	1, 2, 8,9	
CO4	Apply the Classification and Clustering algorithm for a given data set.										3	K3	1, 2,3,8,9	
CO5	Apply the different mining techniques for real time analytics applications.										4	K3	1, 2, 3,8,9	
CO6	Explain the Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics										5	K2	1, 2,8,9	
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1						1	1	1		1		
CO2	2	1						1	1	1		1		
CO3	2	1						1	1	1		1		
CO4	3	2	1					1	1	1		1		
CO5	3	2	1					1	1	1		1		
CO6	2	1			2			1	1	1		1		
C	2	1	1		1			1	1	1		1		