1.1.3

List of Employability/ Entrepreneurship/ Skill Development Courses with Course Contents

Colour Codes		
Name of the Subjects	Yellow	
Employability Contents	Green	
Entrepreneurship Contents	Light Blue	
Skill Development Contents	Pink	

List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department : *Computer Science and Engineering*

Programme Name : *B.Tech.*

Academic Year : 2024-25

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	PPUATB2	ENGINEERING PHYSICS
02.	ITUATE2	INTRODUCTION TO INFORMATION TECHNOLOGY
03.	ECUATE3	BASIC ELECTRICAL ENGINEERING
04.	ELUATHI	ENGLISH FOR COMMUNICATION
05.	MEUALL1	ENGINEERING GRAPHICS
06.	CYUBTB3	ENGINEERING CHEMISTRY
07.	LAUBTCI	COMPUTER PROGRAMMING
08.	IPUBLL2	ENGINEERING WORKSHOP PRACTICES
09.	CS203TES06	DIGITAL LOGIC & DESIGN
10.	CS203TPC01	IT WORKSHOP (C++/PYTHON)
11.	CS203TPC02	COMPUTER NETWORK
12.	CS203TPC03	COMPUTER ORGANIZATION & ARCHITECTURE
13	CS204TPC04	DISCRETE MATHEMATICS
14.	CS204TES07	ELECTRONIC DEVICES & CIRCUITS
15.	CS204TPC05	OPERATING SYSTEM
16.	CS204TPC06	DATA STRUCTURE & ALGORITHMS
17.	CS204THS02	MANAGEMENT-I
18.	CS205TES05	MICROPROCESSOR AND INTERFACES

19.	CS205TPC08	RELATIONAL DATABASE MANAGEMENT SYSTEM
20	CS205TPC09	FORMAL LANGUAGE AND AUTOMATA THEORY
21.	CS205TPC10	PARALLEL COMPUTING
22.	CS205TPE01	SOFTWARE ENGINEERING
23.	CS205TPE02	INFORMATION THEORY & CODING
24.	CS205TPE03	MOBILE COMMUNICATION
25.	CS205TPE04	MULTIMEDIA SYSTEM DESIGN
26.	CS206TPC11	DESIGN AND ANALYSIS OF ALGORITHM
27.	CS206TPC12	JAVA
28.	CS206TPC13	DIGITAL IMAGE PROCESSING
29.	CS203TBS05	MATHEMATICS III (NUMERICAL METHODS)
30.	CS203PPC02	IT WORKSHOP (C++ PYTHON LAB)
31.	CS203PPC02	COMPUTER NETWORK LAB
32.	CS203PES06	DIGITAL LOGIC & DESIGN LAB
33.	CS204PPC03	OPERATING SYSTEM LAB
34.	CS204PPC04	DATA STRUCTURE & ALGORITHM LAB
35.	CS204PES07	ELECTRONIC DEVICE & CIRCUIT LAB
36.	CS206TPE06	ROBOTICS
37.	CS206TPE07	ARTIFICIAL INTELLIGENCE
38.	CS206TPE08	SOFTWARE TESTING AND QUALITY ASSURANCE
39.	CH206TOE01	INDUSTRIAL UTILITIES AND SAFETY
40.	CE206TOE01	METRO SYSTEMS AND ENGINEERING
41.	CS206TOE01	OBJECT ORIENTED PROGRAMMING WITH C++
42.	EC206TOE01	INTRODUCTION TO ELECTRONICS AND CIRCUITS
43.	IP206TOE01	OPERATION RESEARCH
44.	ME206TOE01	AUTOMOBILE ENGINEERING
45.	CS207TPC14	COMPILER DESIGN

46.	CS207TPE09	TCP/IP INTERNETWORKING
47.	CS207TPE10	WEB TECHNOLOGY
48.	CS207TPE11	DATA MINING
49.	CS207TPE12	CYBER CRIME & SECURITY
50.	EC207TOE02	CMOS DIGITAL VLSI DESIGN
51.	CE207TOE02A	GREEN BUILDING AND SUSTAINABLE MATERIAL
52.	CH207TOE02	WASTE TO ENERGY
53.	IT207TOE01	MACHINE LEARNING
54.	CS207TOE01	GIS & REMOTE SENSING
55.	IP207TOE21	MANUFACTURING PROCESS-I
56.	IP207TOE31	PRODUCTION PLANNING AND CONTROL
57.	CS208TPE13	NETWORK SECURITY
58.	CS208TPE14	MOBILE APPLICATION DEVELOPMENT
59.	CS208TPE15	CLOUD COMPUTING
60.	CS208TPE16	BIG DATA ANALYSIS
61.	EC208TOE03	INTRODUCTION TO IoT
62.	IT208TOE01	SOFT COMPUTING
63.	IP208TOE41	ADVANCED MANUFACTURING PROCESS
64.	IP208TOE51	COMPUTER AIDED PROCESS PLANNING (CAPP)
65.	CS208TOE09	ENTERPRISE RESOURCE MANAGEMENT
66.	CS208TOE11	WIRELESS SENSOR NETWORK
67.	CS208PPE01	NETWORK SECURITY LAB
68.	CS208PPE02	MOBILE APPLICATION DEVELOPMENT LAB
69.	CS208PPE03	CLOUD COMPUTING LAB
70.	CS208PPE04	BIG DATA ANALYSIS LAB
71.	CE208TOE03	INFRASTRUCTURE PLANNING AND MANAGEMENT
72.	ME208TOE03	SUPPLY CHAIN MANAGEMENT

73.	CH208TOE03	PLANT ENGINEERING ECONOMICS AND MANAGEMENT
74.	CS208TOE01	ARTIFICIAL INTELLIGENCE
75.	ME207TOE02	PRINCIPLES OF MANAGEMENT
76.	CS207PPC09	COMPILER DESIGN LAB
77.	CS207PPR03	MAJOR PROJECT-I
78.	CS207PPS01	SEMINAR
79.	CS208PPR04	MAJOR PROJECT-II
80.	CS208TOE10	INFORMATION RETRIEVAL SYSTEMS
81.	CS208TOE12	MACHINE LEARNING
82.	CSPATT1	ADVANCED DATA STRUCTURE
83.	CSPATT2	ADVANCED COMPUTER NETWORK
84.	ITPATC1	RESEARCH METHODOLOGY AND IPR
85.	CSPATP1	LOGICS OF COMPUTER SCIENCE
86.	CSPATP2	ADVANCED COMPUTER ARCHITECTURE
87.	CSPATP3	MULTIMEDIA SYSTEM
88.	CSPATP4	ADVANCED ARTIFICIAL INTELLIGENCE
89.	CSPATP5	SPECIALIZED MACHINE LEARNING MULTIMEDIA SYSTEM
90.	CSPATP6	SOFT COMPUTING
91.	CSPATP7	CLUSTER AND GRID COMPUTING SPECIALIZED
92.	CSPATP8	HIGH PERFORMANCE NETWORK
93.	CSPATP9	AD HOC AND WIRELESS SENSOR NETWORK
94.	CSPALT1	ADVANCED DATA STRUCTURE LAB
95.	MSPBT01	BUSINESS ANALYTICS
96.	IPPBT02	INDUSTRY SAFETY
97.	IPPBT03	OPERATION RESEARCH
98.	CEPBT04	COST MANAGEMENT OF ENGINEERING PROJECTS
99.	MEPBT05	COMPOSITE MATERIALS
100.	CHPBT06	WASTE TO ENERGY

101.	CS205PPC05	RELATIONAL DATABASE MANAGEMENT SYSTEM LAB
102.	CS205PPC06	PARALLEL COMPUTING LAB
103.	CS205PPR01	MINOR PROJECT-I
104.	CS206PPC07	DESIGN AND ANALYSIS OF ALGORITHM LAB
105.	CS206PPC08	JAVA LAB
106.	CS206PPR02	MINOR PROJECT-II
107.	CS206TPE05	MANAGEMENT INFORMATION SYSTEM
108.	IT206TOE01	COMPUTER GRAPHICS
109.	ECPBT07	IoT
110.	MCPBT08	MOOCs
111.	CSPALT1	ADVANCED ALGORITHM LAB
112.	CSPALT2	ADVANCED DIP LAB
113.	CSPBTT1	ADVANCED ALGORITHM
114.	CSPBTT2	ADVANCED DIGITAL IMAGE PROCESSING
115.	CSPBTT2	DATA SCIENCE
116.	CSPBTP2	SOFTWARE PROCESS AND PROJECT MANAGEMENT
117.	CSPBTP3	GPU COMPUTING
118.	CSPBTP4	DATABASE ENGINEERING
119.	CSPBTP5	CRYPTOGRAPHY AND NETWORK SECURITY
120.	CSPBT6	MULTI-PROCESSOR SYSTEM
121.	CSE7100	RESEARCH METHODOLOGY IN ENGINEERING
122.	CSE7102	NETWORK SECURITY
123.	CSE7103	SIMULATION AND MODELING
124.	CSE7104	COMPUTER VISION
125.	CSE7105	MACHINE LEARNING

Scheme and Syllabus

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
SECOND YEAR, SEMESTER - III & IV
W.E.F. SESSION 2021-22

Branch:- Computer Science & Engg. Year: II Sem:- III

S.No	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS203TES06	Digital logic & Design	3	1	0	30	70	100	4
2	CS203TPC01	IT workshop (C++ / python)	3	1	0	30	70	100	4
3	CS203TPC02	Computer Network	3	1	0	30	70	100	4
4	CS203TPC03	Computer Organization & Architecture	3	1	0	30	70	100	4
5	CS203TBS05	Mathematics III (Numerical Methods)	3	1	0	30	70	100	4
	PRACTICAL								
1	CS203PPC01	IT workshop (C++ / python) Lab	0	0	3	30	20	50	1.5
2	CS203PPC02	Computer Network Lab	0	0	3	30	20	50	1.5
3	CS203PES06	Digital Logic & Design Lab	0	0	3	30	20	50	1.5
		Total							24.5

Branch:- Computer Science & Engg. Year: II Sem:- IV

S.No	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS204TPC04	Discrete Mathematics	3	1	0	30	70	100	4
2	CS204TES07	Electronic Device & Circuits	3	0	0	30	70	100	3
3	CS204TPC05	Operating System	3	1	0	30	70	100	4
4	CS204TPC06	Data Structure & Algorithms	3	1	0	30	70	100	4
5	CS204THS02	MANAGEMENT I-MANAGEMENT PROCESS AND ORGANIZATIONAL BEHAVIOUR	3	0	0	30	70	100	3
	PRACTICAL								
1	CS204PPC03	Operating System Lab	0	0	3	30	20	50	1.5
2	CS204PPC04	Data Structure & Algorithms Lab	0	0	3	30	20	50	1.5
3	CS204PES07	Electronic Device & Circuits Lab	0	0	3	30	20	50	1.5
		Total							22.5

SCHEME FOR EXAMINATION
B. TECH (FOUR YEAR) DEGREE
COURSE COMPUTER SCIENCE AND ENGG
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
THIRD YEAR, SEMESTER - V
W.E.F. SESSION 2022-23

Branch: - Computer Science & Engg. **Year: III** **Sem- V**

S. No.	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS205TES05	Microprocessor and Interfaces	3	0	0	30	70	100	3
2	CS205TPC08	Relational Database Management System	3	0	0	30	70	100	3
3	CS205TPC09	Formal Language and Automata Theory	3	0	0	30	70	100	3
4	CS205TPC10	Parallel Computing	3	0	0	30	70	100	3
5	CS205TPEX	Professional Elective-I	3	0	0	30	70	100	3
	PRACTICAL								
1	CS205PPC05	Relational Database Management System Lab	0	0	3	30	20	50	1.5
2	CS205PPC06	Parallel Computing Lab	0	0	3	30	20	50	1.5
3	CS205PPR01	Minor Project- I	0	0	3	30	20	50	1.5
						Total			**19.5**

Professional Elective-I Subject V Sem.			
S. No.	Subject Code	Subject	Credits
1	CS205TPE01	Software Engineering	3
2	CS205TPE02	Information Theory & coding	3
3	CS205TPE03	Mobile Communication	3
4	CS205TPE04	Multimedia System Design	3

SCHEME FOR EXAMINATION
B. TECH (FOUR YEAR) DEGREE
COURSE COMPUTER SCIENCE AND ENGG
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
THIRD YEAR, SEMESTER - VI
W.E.F. SESSION 2022-23

S.No.	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS206TPC11	Design and Analysis of Algorithms	3	0	0	30	70	100	3
2	CS206TPC12	Java	3	0	0	30	70	100	3
3	CS206TPC13	Digital Image Processing	3	0	0	30	70	100	3
4	CS206TPEX	Professional Elective-I	3	0	0	30	70	100	3
5	CS206TPEX	Professional Elective-II	3	0	0	30	70	100	3
6	CS206TOEX	Open Elective-I	3	0	0	30	70	100	3
	PRACTICAL								
1	CS206PPC07	Design and Analysis of Algorithms Lab	0	0	3	30	20	50	1.5
2	CS206PPC08	Java Lab	0	0	3	30	20	50	1.5
3	CS206PPR02	Minor Project-II	0	0	3	30	20	50	1.5
		Total							**22.5**

W.E.F. SESSION 2022-23

Branch: - Computer Science & Engg. Year: III Sem- VI

Professional Elective-I & II Subject VI Sem.				Open Elective-I Subject VI Sem.			
S. No	Subject Code	Subject	Credit	S. No.	Subject Code	Subject	Credit
1	CS206TPE05	Management Information System	3	1	CH206TOE01	Industrial utilities andsafety	3
2	CS206TPE06	Robotics	3	2	CE206TOE01	Metro systems andEngineering	3
3	CS206TPE07	Artificial Intelligence	3	3	CS206TOE01	Object Oriented Programming with C++	3
4	CS206TPE08	Software Testing and Quality Assurance	3	4	EC206TOE01	Introduction to Electronics and Circuits	3
				5.	IP206TOE01	Operation Research	3
				6.	IT206TOE01	Computer Graphics	3
				7.	ME206TOE01	Automobile Engineering	3

SCHEME FOR EXAMINATION B.TECH (FOUR YEAR) DEGREE
COURSE , COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
FOURTH YEAR, SEMESTER - VII
W.E.F. SESSION 2023-24

Branch :- Computer Science & Engg. Year : IV Sem- VII

S.No.	Code No.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS207TPEX	Professional Elective-I	3	0	0	30	70	100	3
2	CS207TPEX	Professional Elective-II	3	0	0	30	70	100	3
3	CS207TOEX	Open Elective-I	3	0	0	30	70	100	3
4	CS207TPC14	Compiler Design	3	0	0	30	70	100	3
	PRACTICAL								
1	CS207PPC09	Compiler Design Lab	0	0	3	30	20	50	1.5
2	CS207PPR03	Major Project –I	0	0	6	60	40	100	3
3	CS207PPS01	Seminar	0	0	3	50	--	50	1.5
		Total							18

Professional Elective-I & II Subject VII Sem.				Open Elective-I Subject VII Sem.			
S.No	Subject Code	Subject	Credits	S.No.	Subject Code	Subject	Credits
1	CS207TPE09	TCP/IP Internetworking	3	1.	EC207TOE02	CMOS Digital VLSI Design	3
2	CS207TPE10	Web Technology	3	2.	CE207TOE02A	Green Building and Sustainable Materials	3
3	CS207TPE11	Data Mining	3	3.	ME207TOE02	Principles of Management	3
4	CS207TPE12	Cyber Crime & Security	3	4.	CH207TOE02	Waste to Energy	3
				5.	IT207TOE01	Machine Learning	3
				6.	CS207TOE01	GIS & Remote sensing	3
				7.	IP207TOE21	Manufacturing Processess-I	3
				8.	IP207TOE31	Production Planning and Control	3

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY GURU GHASIDAS VISHWAVIDYALAYA
FOURTH YEAR, SEMESTER - VIII
W.E.F. SESSION 2023-24

Branch :- Computer Science & Engg. **Year : IV** **Sem- VIII**

S.No.	Code No.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS208TPEX	Professional Elective-I	3	0	0	30	70	100	3
2	CS208TOEX	Open Elective-I	3	0	0	30	70	100	3
3	CS208TOEX	Open Elective-II	3	0	0	30	70	100	3
	PRACTICAL								
1	CS208PPEX	Professional Elective-I Lab	0	0	3	30	20	50	1.5
2	CS208PPR04	Major Project -II	0	0	12	120	80	200	6
		Total							**16.5**

Professional Elective-I Subject VIII Sem.				Open Elective-I Subject VIII Sem.			
S.No	Subject Code	Subject	Credits	S.No.	Subject Code	Subject	Credits
1	CS208TPE13	Network Security	3	1	EC208TOE03	Introduction to IoT	3
2	CS208TPE14	Mobile Application Development	3	2	CE208TOE03	Infrastructure Planning and Management	3
3	CS208TPE15	Cloud Computing	3	3	ME208TOE03	Supply Chain Management	3
4	CS208TPE16	Big Data Analysis	3	4	CH208TOE03	Plant Engineering Economics and Management	3
				5	IT208TOE01	Soft Computing	3
				6	CS208TOE01	Artificial Intelligence	3
				7.	IP208TOE41	Advanced Manufacturing Processs	3

				8.	IP208TOE51	Computer Aided Process Planning (CAPP)	3

Open Elective- II Subject VIII Sem.			
S.No.	Subject Code	Subject	Credits
1	CS208TOE09	Enterprise Resource Management	3
2	CS208TOE10	Information Retrieval Systems	3
3	CS208TOE11	Wireless Sensor Network	3
4	CS208TOE12	Machine Learning	3

Professional Elective Subject Lab VIII Sem			
S.No	Subject code	Subject	Credits
1	CS208PPE01	Network Security Lab	1.5
2	CS208PPE02	Mobile Application Development Lab	1.5
3	CS208PPE03	Cloud Computing Lab	1.5
4	CS208PPE04	Big Data Analysis Lab	1.5

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY, GGV,
BILASPUR, C.G. (INDIA)

SCHEME OF EXAMINATION

M.TECH. COMPUTER SCIENCE AND ENGINEERING

M.Tech. I-Semester

Sl.	Course Type/ Code	Subjects	Periods/Week			Evaluation			Credits
			L	T	P	IA	ESE	Total	
1	CSPATT1	Advanced Data Structure	3	0	0	40	60	100	3
2	CSPATT2	Advanced Computer Network	3	0	0	40	60	100	3
3	ITPATC1	Research Methodology and IPR	2	0	0	-	50	50	2
4	CSPATP1 CSPATP2 CSPATP3	Professional Elective -I 1. Logics of Computer Science 2. Advance Computer Architecture 3. Multimedia System	3	0	0	40	60	100	3
5	CSPATP4 CSPATP5 CSPATP6	Professional Elective -II 1. Advanced Artificial Intelligence 2. Specialized Machine Learning Multimedia System 3. Soft Computing	3	0	0	40	60	100	3
6	CSPATP7 CSPATP8 CSPATP9	Professional Elective -III 1. Cluster and Grid Computing Specialized 2. High Performance Network 3. Ad Hoc and Wireless Sensor Network.	3	0	0	40	60	100	3
7.	CSPALT1	Advanced Data Structure Lab	0	0	3	30	20	50	2
		Total	17	0	3	230	370	600	19

M.Tech. II-Semester

Sl.	Course Type/ Code	Subjects	Periods/Week			Evaluation			Credits
			L	T	P	IA	ESE	Total	
1.	CSPBTT1	Advanced Algorithm	3	0	0	40	60	100	3
2.	CSPBTT2	Advanced Digital Image Processing	3	0	0	40	60	100	3
3.	CSPBTP1 CSPBTP2 CSPBTP3	Professional Elective-I 1. Data Science 2. Software Process and Project Management 3. GPU Computing	3	0	0	40	60	100	3
4.	CSPBTP4 CSPBTP5 CSPBTP6	Professional Elective-II 1. Data Base Engineering 2. Cryptography and Network Security 3. Multi-processor System	3	0	0	40	60	100	3
5.	MSPBTO1 IPPBTO2 IPPBTO3 CEPBTO4 MEPBTO5 CHPBTO6 ECPBTO7 MCPBTO8	Open Elective-1 1. Business Analytics 2. Industrial Safety 3. Operations Research 4. Cost Management of Engineering Projects 5. Composite Materials 6. Waste to Energy 7. IoT 8. MOOCs	3	0	0	40	60	100	3
6.	CSPALT1	Advanced Algorithm Lab	0	0	3	30	20	50	2
7.	CSPALT2	Advanced DIP Lab	0	0	3	30	20	50	2
8.	ELPBTX1 PEPBTX2 CEPBTX3 LAPBTX4	Audit Course/Value Added Course English for Research Paper Writing Stress Management by Yoga Disaster Management Constitution of India	2	0	0	40	60	100	2
Total			17	0	06	300	400	700	21

Note: Under MOOCs the students have to opt any subject other than Computer Science and Engineering from NPTEL/UGC SWAYAM

M.Tech. III-Semester

Sl.	Course Type/ Code	Subjects	Periods/Week			Evaluation			Credits
			L	T	P	IA	ESE	Total	
1.	CSPCLT1	Dissertation Stage–I	0	0	28	100	100	200	14
Total			0	0	28	100	100	200	14

M.Tech. IV-Semester

Sl.	Course Type/ Code	Subjects	Periods/Week			Evaluation			Credits
			L	T	P	IA	ESE	Total	
1.	CSPDPT1	Dissertation Stage–II	0	0	32	100	200	300	16
Total			0	0	32	100	200	300	16

Total Credits for the Program = 19 + 21 +14 +16 = 70

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES (ENGINEERING AND TECHNOLOGY)
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G)
EVALUATION SCHEME FOR Pre- Ph.D. COURSE WORK

EFFECTIVE FROM SESSION 2021-2022

S. No.	Name of Subject	Subject Code	Periods /Week L-T-P	ESE Duration	ESE MARKS		Credits
					Max	Min	
1	Research Methodology in Engineering	IT7100	3-1-0	3Hrs	100	50	4
2	Elective -I	CSE71XX	3-1-0	3Hrs	100	50	4
3	Elective -II	CSE71XX	3-1-0	3Hrs	100	50	4
4	Seminar	IT7101	-	-	Qualified/ Not Qualified		0
	Total		9-3-0		300	150*	12

	LIST OF ELECTIVES	**
S.N.	Name of the Subject	Subject Code
1	Network Security	CSE7102
2	Simulation & Modeling	CSE7103
3	Computer Vision	CSE7104
4	Machine Learning	CSE7105

Duration of Semester will be 6 months

- Candidate has to score minimum 60% of the aggregate marks to qualify in ESE.
- Two core subjects as Electives (4 Credits each) to be decided by the DRC.

ESE: End Semester Examination L: Lecture T: Theory P: Practical
Max: Maximum marks in ESE;
Min: Minimum pass Marks in each subject as 50%

Sub Title: COMPUTER ORGANIZATION & ARCHITECTURE		
Sub Code: CS203TPC03	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. Conceptualize the basics of organizational and architectural issues of a digital computer.
2. Analyze processor performance improvement using instruction level parallelism.
3. Learn the function of each element of a memory hierarchy.
4. Study various data transfer techniques in digital computer.
5. Articulate design issues in the development of processor or other components that satisfy design requirements and objectives.

UNIT No	Syllabus Content	No of Hours
1	**Basic of Computer Organization & Architecture:** Introduction, Computer Organization vs. Computer architecture, Von Neumann Architecture vs. Harvard Architecture. **Input & Output Organization:** Introduction, Simple Bus Architecture, Types of Buses, I/O Communication Methodologies: Programmed I/O (Polling), Interrupt-driven I/O & Direct Memory Access (DMA), I/O channel & I/O Processor, Accessing I/O device: Memory Mapped I/O, Isolated or I/O Mapped.	10
2	**Computer Arithmetic:** Introduction, Addition & Subtraction: Addition & Subtraction with Signed-Magnitude Data, Hardware Implementation & Algorithm, Addition & Subtraction with Signed-2's Complement Data, Multiplication Algorithm: Hardware Implementation for Signed-Magnitude Data, Hardware Algorithm, Booth Multiplication Algorithm, Array Multiplier, Division Algorithms: Hardware Implementation for Signed-Magnitude Data & Algorithm , Carry Look Ahead Adder.	10
3	**Memory Organization:** Introduction, Types of Memory, Memory Hierarchy, Main Memory, Cache Memory, Virtual Memory, Associative Memory. Processor Organization: Introduction, Control Unit: Hardwired Control Unit, Micro programmed Control Unit, Instruction Set Computer: Reduced Instruction Set Computer (RISC) vs. Complex Instruction Set Computer(CISC).	10

4	**Pipelining:** Introduction, Concept of Instruction Pipeline, Design Problems with Pipeline: Structural Hazard, Data Hazard & Control Hazard, Extension in Pipeline Designed: Super Pipelining, Superscalar Processor, Very Long Instruction Width (VLIW) Architecture.	8
5	**Multiprocessor System:** Introduction, Shared Memory Multiprocessor, Distributed Memory Multiprocessor, Flynn's Classification: Single Instruction Single Data (SISD), Single Instruction Multiple Data (SIMD), Multiple Instruction Single Data (MISD), Multiple Instruction Multiple Data (MIMD), Cache Coherence, Message Passing Model, Cluster Computing, Distributed Computing.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the computer architecture concepts.
CO2: Understand and apply different number systems and codes.
CO3: Understand memory hierarchy and its impact on computer cost/performance.
CO4: Design a pipeline for consistent execution of instructions with minimum hazards.
CO5: Understand the concepts of multiprocessor.

Text Books:

1. Computer System Architecture, M. Morris Mano, Pearson Education India.
2. Computer Organization & Architecture, W. Stalling, Pearson Education India.

Reference Books:

1. Computer Architecture & Organization, J. P. Hayes, McGraw-Hill India.
2. Computer System Organization, Naresh Jotwani, Mc Graw Hill, India.
3. Computer System Architecture, P. V. S. Rao, PHIIndia.
4. Advanced Computer Architecture, Rajiv Chopra, S. Chand India.
5. Computer Organization & Architecture, Lalit K. Arora, Anjali Arora, S. K. Kataria & Sons, India.
6. Computer Fundamentals Architecture & Organization, B Ram, Sanjay Kumar, New Age International, India.

Sub Title: DIGITAL LOGIC & DESIGN		
Sub Code: CS203TES06	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. The concept of various components.
2. The concepts that underpin the disciplines of analog and digital electronic logic circuits.
3. Various Number system and Boolean algebra.
4. Design and implementation of combinational circuits.
5. Design and implementation of Sequential circuits.

UNIT No	Syllabus Content	No of Hours
1	**Binary System:** Binary Number , Number Base conversion , Octal and Hexadecimal Numbers Complements, Binary Codes Binary Storage and Registers , Binary Logic , Integrated Circuits. **Boolean Algebra and Logic Gates:** Basic Definitions Axiomatic Definition of Boolean algebra .Basic Theorems and Properties of Boolean algebra Boolean Functions Canonical and Standard Forms .Other Logic Operations Digital Logic Gates . IC Digital Logic Families. NAND, NOR, EOR gates.	10
2	**Boolean Functions Combination Logic:** The map method Two and Three Variable Maps, Four Variable Map Product of sums Simplification, NAND and NOR implementation, Don't Care Conditions, The Tabulation Method **Combinational Logic:** Introduction, Design procedure Adders, Sub tractors .Code Conversion, Analysis Equivalence Functions	10
3	**Combinational Logic with MSI and LSI:** Introduction Binary Parallel Adder, Decimal, Adder, Magnitude Comparator, Decoders, Multiplexers, Read – Only Memory (ROM), Programmable Logic Array (PLA) Concluding Remarks	10
4	**SEQUENTIAL LOGIC:** Introduction, Flip –Flops, triggering of Flips –Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip –Flop Excitation Tables Design Procedure. Design of Counters, Design with State Equations.	8
5	**Registers, Counters, Memory Unit & FPGA Programing:** Introduction, Registers, shift Registers .Ripple Counters, Synchronous Counters. Timing Sequences, The Memory Unit Examples of Random Access Memories, FPGA: Introduction, FPGA Programming	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the concepts of various components to design stable analog circuits.
CO2: Represent numbers and perform arithmetic operations.
CO3: Minimize the Boolean expression using Boolean algebra and design it using logic gates.
CO4: Analyze and design combinational circuit.
CO5: Design and develop sequential circuits.
CO6: Translate real world problems into digital logic formulations using VHDL.

Text Books:

1. Digital Logic & Computer Design PH1 M Mano
2. Switching Circuit & Finite automata –ZVI Kohavi (TMH)
3. Fletcher W.I.: An engineering approach to Digital design PH1

Reference Books:

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

Sub Title: IT WORKSHOP (C++ / PYTHON)		
Sub Code: CS203TPC01	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. To know different programming paradigms.
2. To study and understand the object oriented programming concepts and methodology.
3. To implement object oriented programming concepts in C++.
4. To direct and handling file streaming
5. To learn introductory Python environment and program structure

UNIT No	Syllabus Content	No of Hours
1	**Abstract Data Types And Programming Environment:** TC++ Environment, variables, Compilation and Linking steps, functions and parameters Object identity, concept of Classes. arrays, control statements. C++ in different plate forms DOSBOX etc.	10
2	**Object-Oriented Programming:** Programming using class and objects, functions, return types, pointer, concepts of encapsulation, default, parametric ,hybrid and copy constructors, destructors, memory management operators	10
3	**Advance Concepts of Object-Oriented Programming:** Polymorphism operator and function overloading, Inheritance in object oriented design, Brief concepts of Aggregation, Generalization, Specification. Design concepts Flowchart , Decision table, virtual class and virtual functions	10
4	**File Handling:** Input &output Streams and object handling in file, Ios family class, text& binary files ,Basic character operations, file opening modes ios flags , ,seekg(),tell(),seekp(),tellp(),command line arguments Streaming and File input and output handling	8
5	**Introduction to Python:** Introduction of Python Programming: python programming environment, research areas and applications of python, Data representation, introductory level programming in python.	7

COURSE OUTCOMES: The students would have learnt

CO1: Programming environment and basic elements
CO2: Key features of the object-oriented programming language.
CO3: Advance concepts of object-orientedconcepts.
CO4: Streaming concepts for file handling
CO5: Introduction of Python programming environment

Text Books:

1. Object Oriented Programming with C++ by E Balaguruswami, TMH2019
2. Object Oriented Programming with C++ by Robert Lafore, Waite Group 2016
3. Machine Learning Tom M. Michell,Mc Graw Hill ,Indian addition
4. Applied Machine Learning by M. Gopal ,McGraw Hill Education

Reference Books:

1. Introduction to python by Bill Luboveni by O'Relly
2. Object Oriented Programming with C++ by M P Bhave S,A. Patekar, Pearson Education
3. The Complete reference by Herbit Schildt,Mc Graw Hill
4. C++ premier by F.B. Lippman, Addition Wesley
5. The C++ Programming Language,Bajanstroustrup ,Addition Wesley

Sub Title: COMPUTER NETWORK		
Sub Code: CS203TPC02	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. Discuss the basic taxonomy and terminology of the computer networking.
2. Discuss the functionality of different layers of OSI Model.
3. Discuss different protocols of TCP/IP protocol suite.
4. Discuss the process of IP addressing and working of routing protocols.
5. Discuss the different challenges of Internetworking, Congestion control and Quality of services.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** **Data communications:** Components, Data representation, Direction of data flow(simplex, half duplex, full duplex) **Networks:** Distributed processing, Network criteria, Physical structure (type of connection, topology), categories of network (LAN, MAN,WAN);Internet: brief history, internet today, Protocols and standard **Reference models:** OSI reference model, TCP/IP reference model, their comparative study. **Physical Layer:** Transmission technology.	10
2	**Data Link Layer:** Types of errors, Error detection & correction methods, Framing(character and bit stuffing), Flow control, Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ **Medium access sub layer:** Point to point protocol, Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, Token ring, Reservation, Polling, FDMA, TDMA, CDMA.	10
3	**Network Layer:** **Internetworking devices**: Repeaters, Hubs, Bridges, Switches, Router, Gateway **Addressing**: IP addressing, classful addressing, subnetting. **Routing**: Techniques, Static vs. Dynamic routing, Routing table for classful address, Flooding, Shortest path algorithm, Distance vector routing, Link state routing. **Protocols:** ARP, RARP, IP, ICMP, IPV6.	10

4	**Transport Layer:** Process to process delivery, UDP: Services and applications. TCP: Stream Oriented Service, Segment, Timers, Congestion control techniques; Avoidance and Detection.	8
5	**Application Layer:** DNS, SMTP, FTP, HTTP & WWW, **Security:** Cryptography, User authentication, Security protocols in internet, Firewalls. Recent research topic on networking.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the working of different internetworking devices.
CO2: Understand the working of Internet.
CO3: Understand the difference between OSI and TCP/IP.
CO4: Understand the security mechanism in Networking.
CO5: Understand core concept of IP addressing and routing.

Text Books:

1. Data Communications and Networking by B. A. Forouzan – TMH Publication.
2. Computer Networks by S. Tanenbaum – Pearson Education/PHI

Publication. Reference Books:

1. Internetworking with TCP/IP by Comer – Pearson Education/PHI byPublication.
2. Data and Computer Communications by W. Stallings – PHIPublication.

Sub Title: MATHEMATICS III (Numerical Methods)		
Sub Code: CS203TBS05	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.
2. To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering which requires computing of numerical results using certain raw data.
3. To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.
4. To deal with various topics like finding roots of equations, solving systems of linear algebraic equations, interpolation and regression analysis, numerical integration & differentiation, solution of differential equation, boundary value problems, solution of matrix problems.
5. To facilitate numerical computing.

UNIT No	Syllabus Content	No of Hours
1	Introduction of Errors and their Analysis, types of errors, numerical problems on error analysis, curve fitting: method of least squares, fitting of exponential curves , fitting of the curve , fitting of the curve .Method of moments	10
2	**Numerical Solution of Algebraic and Transcendental Equations:** Graphical method bisection Method, Secant Method, Regula-falsi Method, Newton Raphson Method, Solution of a system of simultaneous linear algebraic Equations Direct methods: Gauss elimination Method, Gauss Jordan method, Iterative methods .Jacobi Iterative Method, Gauss Seidel Iterative method.	10
3	**The Calculus of Finite Differences:** Finite differences, Difference formula, operators and relation between operators. Inverse Operator, Interpolation with equal intervals: - Newton's forward and backward interpolation formula, Interpolation with Unequal intervals: - Lagrange's interpolation Newton's difference formula, inverse interpolation.	10

4	**Numerical Differentiation and Integration:** Numerical Differentiation Newton's forward and Backward difference interpolation formula. Maxima and Minima of aTabulated function, Numerical Integration :-Trapezoidol rule, simpson's (1/3) rd and (3/8) th rule, Boole's rule, weddle rule. Difference Equations: Definition ,order and degree of a difference equation, Linear difference equations, Difference equations reducible to Linear form, simultaneous difference equations with constant coefficients	8
5	**Numerical solution of ordinary differential equation:** Taylor series method, Euler's method, Modified Euler method Runge's method Runge-Kutta method, numerical method for solution of partial differential equations. General linear partial differential equation.Laplace equation and Poisson equation.	7

COURSE OUTCOMES: The students would have learnt

CO1: Apply Numerical analysis, which has enormous application in the field of Science and some fields of Engineering.
CO2: Familiar with finite precision computation.
CO3: Familiar with numerical solutions of nonlinear equations in a single variable.
CO4: Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.
CO5: Familiar with calculation and interpretation of errors in numerical method.

Text Books:

1. Jain & Iyngar Numerical Methods for Scientific and Engineering Computations.
2. Rao G.S. Numerical Anlysis.
3. Grewal B S Numerical Methods In Engineering and Science.
4. Das K K Advance Engineering Methods.
5. Rajaraman V Computer Oriented Numerical Methods
6. P. Kandasamy K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
7. S. S. Sastry, Introduction methods of Numerical Analysis, PHI, 4th Edition, 2005.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Computer Networks by S. Tanenbaum – Pearson Education/PHIPublication.

Sub Title: IT WORKSHOP (C++ / PYTHON) LAB	
Sub Code: CS203PPC01	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To discuss Turbo C++ environment
2. To discuss the various basic object oriented programming constructs like functions, properties and application.
3. To discuss advanced programming concepts and program designing.
4. Discussion Programming on file input output handling
5. To discuss basic environment of python programming

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• To implement various datatypes and their memory requirement in TC++ programming • To implement various in classes and members functions. • To show matrix operation • To implement functions function and argument passingmethods • To implement different function return types. • To implement concept of polymorphism. • To implement concept of virtual function and virtual class. • To implement the concept file handling. • To implement the concept of file importing in python environment. • To implement the concept of coding and execution of introductory program.	18

LAB OUTCOMES: The students would have learnt

CO1: TC++ programming Environment and programming IDE
CO2: Implementation of basic object oriented operations
CO3: Implementation of advanced programming concepts.
CO4: Implementation of file input output streams and file handling operations.
CO5: Implementation of introductory python programming language

Text Books:

1. Object Oriented Programming with C++ by E Balaguruswami, TMH
2. Object Oriented Programming with C++ by Robert Lafore, WaiteGroup
3. Introduction to python by Bill Luboveni by O'Relly

Reference Books:

1. Object Oriented Programming with C++ by M P Bhave S,A. Patekar, Pearson Education
2. The Complete reference by Herbit Schildt,Mc Graw Hill
3. The C++ Programming Language, Bajanstroustrup ,Addition Wesley
4. Machine Learning Tom M. Michell,Mc Graw Hill ,Indian addition
5. Applied Machine Learning by M. Gopal ,McGraw Hill Education

Sub Title: DIGITAL LOGIC & DESIGN LAB	
Sub Code: CS203PES06	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To discuss the fundamental concepts of digital logic design
2. Identify various ICs and their specification.
3. To discuss various logic Gates
4. Design and implementation of combinational circuits.
5. Design and implementation of Sequential circuits

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Implement 3 input AND gate using 2 input AND gates and 3 input OR gate using 2 input OR gates. • Implement NAND gate using AND gates and NOR using OR gates. • Design a circuit that evaluates the determinant of a 2 X 2 binary matrix (Note: State any assumptions made about input and output representations). • Design a circuit that takes two unsigned 2-bit numbers (a and b), and displays one of greater (a > b), lesser (a < b) or equal (a == b) signals. • Half Adder, Full Adder and Ripple Carry Adder Implementation. • Add two 2 digit BCD numbers. Display using 7-segment displays. • Subtract two 2-digit BCD numbers. • Design Master Slave J-K Flip flop. • Design a 2-bit Synchronous up counter using D flip flop IC's. Display the output on a 7-segment LED display • Sequence generator using shift registers • Design and verify 4-bit synchronous counter.	18

LAB OUTCOMES: The students would have learnt

CO1: Understand the concepts of various components to design stable analog circuits.
CO2: Represent numbers and perform arithmetic operations.
CO3: Minimize the Boolean expression using Boolean algebra and design it using logic gates.
CO4: Analyze and design combinational circuit.
CO5: Design and develop sequential circuits

Text Books:

1. Digital Logic & Computer Design PHI M Mano
2. Switching Circuit & Finite automata –ZVI Kohavi (TMH)

Reference Books:

1. An engineering approach to Digital design PHI Fletcher W.I

Sub Title: COMPUTER NETWORK LAB	
Sub Code: CS203PPC02	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To discuss the fundamental concepts of Networking.
2. To discuss the different devices used in Computer Network.
3. To discuss IP addressing concept like Subnetting and Supernetting.
4. To design Virtual LAN concept using port based and subnet based method.
5. To design WiFi System using Wireless Access Point and Adapter

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Study of different addresses (MAC, IP, Port and URL) used in computer network. • Study of different types of transmission media. • To implement point to point network using UTP cable and RJ-45 connector. • Study of different commands used in Computer Network. • Study of different networking devices used in Computer Network. • To implement Local Area Network using Unmanaged Switch. • To implement Local Area Network using Managed Switch. • To implement the Virtual LAN using port based method of Managed Switch. • To implement the Virtual LAN using subnet based method of Managed Switch. • To implement Wireless LAN using Wireless Access Point and Wireless Adapter.	18

LAB OUTCOMES: The students would have learnt

CO1: Understand the basic concept of Networking.
CO2: Understand the functionality of different devices.
CO3: Understand the designing of local Area Network using networking devices.
CO4: Understand addressing concept of networking.
CO5: Understand the designing of Wireless LAN.

Text Books:

1. Data Communications and Networking by B. A. Forouzan – TMH Publication.
2. Computer Networks by S. Tanenbaum – Pearson Education/PHIPublication

Reference Books:

1. Internetworking with TCP/IP by Comer – Pearson Education/PHI byPublication.
2. Data and Computer Communications by W. Stallings – PHIPublication

Sub Title: DISCRETE MATHEMATICS		
Sub Code: CS204TPC04	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contrapositives using truth tables and the properties of logic.
2. Express a logic sentence in terms of predicates, quantifiers, and logical connectives
3. Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion.
4. Determine the domain and range of a discrete or non-discrete function, graph functions, identify one-to-one functions, perform the composition of functions, find and/or graph the inverse of a function, and apply the properties of functions to application problems.
5. Describe binary relations between two sets; determine if a binary relation is reflexive, symmetric, or transitive or is an equivalence relation; combine relations using set operations and composition.

UNIT No	Syllabus Content	No of Hours
1	**Sets, Relation and Function:** Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.	10
2	Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination. Principle of Mathematical Induction, The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor, Euclidean Algorithm, The Fundamental Theorem of Arithmetic.	10
3	**Propositional Logic:** Basic Connectives and Truth Tables, Logical Equivalence, The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. **Proof Techniques:** Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.	10

4	**Algebraic Structures and Morphism:** Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form	8
5	**Graphs and Trees:** Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Four colour conjecture, trees and rooted trees, binary trees.	7

COURSE OUTCOMES: The students would have learnt

CO1: Students completing this course will be able to express a logic sentence in terms of predicates, quantifiers, and logical connectives.
CO2: Students completing this course will be able to applythe rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction.
CO3: Students completing this course will be able to use tree and graph algorithms to solve problems.
CO4: Students completing this course will be able to evaluate Boolean functions and simplify expressions using the properties of Boolean algebra

Text Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw– Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, TataMcgraw-Hill
3. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
4. Discrete Mathematics, Tata McGraw - Hill

Sub Title: ELECTRONIC DEVICE & CIRCUITS		
Sub Code: CS204TES07	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To understand practical applications of PN junction diode.
2. To study basic principle of BJT, JFET and MOSFET their characteristics and amplifiers.
3. To understand working of BJTs at low and high frequencies.
4. To understand the working of different types of feedback amplifiers.
5. To understand the working of different types of oscillators.

UNIT No	Syllabus Content	No of Hours
1	**Junction Diode And Its Application:** Properties of P-N Junction, Open Circuited P-N Junction, Current component of PN Diode, V-I Characteristics, Temperature dependence of V-I Characteristics, Diode resistance, Diode as a rectifier-Half wave & Full wave rectifier, Clipper, Clamper.	8
2	**Bipolar Junction Transistor and FET:** Introduction to Bipolar Junction Transistor, Transistor current components. Transistor as an amplifier, Transistor construction, Transistor Circuit Configuration (Common Base , Common Emitter, Common Collector) and Characteristics CE current gain, Analytical expression for transistor characteristics. Introduction to JFET, MOSFET, V-I and Transfer characteristics of JFET.	7
3	**Low Frequency Transistor Amplifier**: Graphical Analysis of CE amplifier, h-parameter Models, Transistor hybrid model, Analysis of Transistor amplifier using H-Parameter for CB, CE, CC configurations, Comparison of Transistor Amplifier Configuration, Darlington Pair. **High Frequency:** CE hybrid-pi model: Validity and parameter Variation, Current Gain with Resistive load, frequency response of a single stage CE Amplifier, Gain-Bandwidth product.	7
4	**Feedback Amplifier**: Classification of feedback amplifier, Feedback concept, Properties of feedback amplifier, Effect of feedback on gain and impedance, Emitter and Source follower. **Oscillator:** Barkhausen criteria, Wien bridge, Tuned, Hartley, Colpitt and RC Phase shift oscillators.	7

5	**Operational Amplifiers:** OPAMP Symbol and terminal characteristics, Block Schematic of OPAMP, Ideal OPAMP Characteristics, Practical OPAMP Characteristics, Inverting Amplifier, Non-Inverting Amplifier, Voltage Follower, Adder, Substractor, Comparator, Integrator, Differentiator, IC Timer-555, Introduction to Multivibrators, Monostable, Bistable, Astable Multivibrator.	7

COURSE OUTCOMES: The students would have learnt

CO1: Learn the design practical circuit using diodes.
CO2: Learn the Characteristics of BJT, FET and MOSFET
CO3: Evaluate frequency response to understand behavior of Electronics circuits.
CO4: Analyze important types of integrated circuits and demonstrate the ability to design practical circuits that perform the desired operations.
CO5: Learn the Designing of different oscillator circuits for various frequencies.
CO6: Gain knowledge about Differential amplifier and operational amplifier and Designing circuits for op-amp applications.

Text Books:

1. Electronic Devices and Circuit Theory, Robert L. Boylestad & L. Nashelsky, K. L. Kishore, 9th Edition, PHI
2. Integrated Electronics: Analog & Digital Circuit Systems, Jacob Millman & Halkias, Tata McGraw Hill.
3. Microelectronics, Millman and Grabel, Tata McGraw Hill.
4. Integrated Circuits by K. R. Botkar, 9th Ed., Khanna Publications

Reference Books:

1. Electronic Devices & Circuits, Allen Mottershead, PHI.
2. Microelectronic Circuits, Sedra and Smith, 5th Edition, Oxford University Press.
3. Operational Amplifiers by R. Gayekwad, 4th Ed., Pearson Education

Sub Title: OPERATING SYSTEM		
Sub Code: CS204TPC05	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. To understand the main components of an OS & their functions.
2. To study the process management and scheduling.
3. To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.
4. To understand the concepts and implementation Memory management policies and virtual memory.
5. To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS
6. To study the need for special purpose operating system with the advent of new emerging technologies

UNIT No	Syllabus Content	No of Hours
1	Introduction to Operating System objective and function. System components system services, system structure, batch interactive, time –Sharing and real time operating system, Protection. The introduction of window NT,DOS, Window 07, Unix ,Linux (Red hat)	10
2	**Concurrent Process:** Process concepts, principal of concurrency. The producer consumer problem, the critical section problem, semaphore, classical problem in concurrency, inter process communication, process generation, process scheduling.	10
3	**CPU Scheduling:** Scheduling concepts, performance criteria scheduling algorithms. Algorithm evaluation, multiprocessor scheduling. I/O management and Disk scheduling I/O devices and organization of the I/O functions. I/O buffering disk I/O operating system design issues.	10
4	Dead Locks system models, deadlock characterization, prevention, avoidance and detection recovery from deadlock, combined approach.	8

5	**Memory Management:** Base machine , Residence monitor , multiprogramming with fixed partition , multiprogramming with variable partitions, multiple base register , paging , segmentation , paging segmentation, virtual memory concepts , demand paging performance , page replacement algorithms , allocation of frames, thrashing , cache memory organization impact on performance .	7

COURSE OUTCOMES: The students would have learnt

CO1: Describe the important computer system resources and the role of operating system in their management policies and algorithms.
CO2: Understand the process management policies and scheduling of processes by CPU
CO3: Evaluate the requirement for process synchronization and coordination handled by operating system
CO4: Describe and analyze the memory management and its allocation policies.
CO5: Identify use and evaluate the storage management policies with respect to different storage management technologies.
CO6: Identify the need to create the special purpose operating

Text Books:

1. Milenkovic M. , Operating System concepts , MGH
2. Tanenbaubm A. S. Operating System design and implementation, PHI
3. Silberschartz A.and Patterson J.I. , " Operating system concepts ", Wisley.

Reference Books:

1. Stilling William, Operating System, Maxwell McMillan International Edition 1992.
2. Dectel H.N., An introduction to operating system, Addision Wisley.

Sub Title: DATA STRUCTURE & ALGORITHMS		
Sub Code: CS204TPC06	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:23

COURSE OBJECTIVE:

1. Understand and remember algorithms and its analysis procedure.
2. Introduce the concept of data structures through ADT including List, Stack, Queues.
3. To design and implement various data structure algorithms.
4. To introduce various techniques for representation of the data in the real world.
5. To develop application using data structure algorithms.
6. Compute the complexity of various algorithms.

UNIT No	Syllabus Content	No of Hours
1	String algorithms, pattern search and editing, Arrays algorithms, development simple examples of algorithm development, complexity, Divided & conquer, binary search, selection sort, insertion sort, merge sort, quick sort complexity of sorting.	10
2	Linear list: Stacks, application of Stacks, arithmetic notations, recursion, queues and circular queues, Linked list definition, insertion and deletion of nodes, circular and doubly linked list, Header nodes.	10
3	Trees, AVL trees, Threaded trees, Heap sort, B-tress.	10
4	**Graph and representation:** graph algorithms, optimization and Greedy methods, minimum spanning tree, shortest path, DFS, BFS search, examples of backtracking sets UNION and FIND operations tables and information retrievals, hashing.	8
5	Files: File organization, sequential file, direct file organization, index sequential file organization, Data storage and management.	7

COURSE OUTCOMES: The students would have learnt

CO1: Select appropriate data structures as applied to specified problem definition.
CO2: Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
CO3: Students will be able to implement Linear and Non-Linear data structures.
CO4: Implement appropriate sorting/searching technique for given problem.
CO5: Design advance data structure using Non- Linear data structure.
CO6: Determine and analyze the complexity of given Algorithms.

Text Books:

1. Data Structures and Algorithm Analysis in C++, 2/e by Mark Allen Weiss, Pearson Education
   Wirth Niclaus , Algorithm Data Structure Programs PHI
2. Horwitz E. and Sahani S. Fundamentals and Data Structure , Computer Science Press.
3. Knuth D. Threat of Computer Programming ", Vol 1-2 Addision -Wesley
4. Aho A.V.Hopcraft and Ullman J.E. "Data Structure and Algorithms, addsion Wesley.

Reference Books:

1. Tanonbaum , A. M. and Augenstein , M.J. "Data Structure with Pascal" PHI.
2. Trambley and Sorenson "Data Structure using Pascal, MGH.
3. Stubbs D. Data Structure with Abstract Data Type and Modula 2, Brooks & Cole Publication
   Comp.

Sub Title: MANAGEMENT PROCESS AND ORGANIZATIONAL BEHAVIOUR		
Sub Code: CS204THS02	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:23

COURSE OBJECTIVES:

1. To help the students to develop cognizance of the importance of Management processes.
2. To enable students to describe how people behave under different conditions and understand why people behave as they do.
3. To provide the students to analyses specific strategic human resources demands for future action.
4. To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control management processes, human behaviour and improve results.

UNIT No	Syllabus Content	No of Hours
1	School of Management Thought: Evolution of Management thought, Systems and Contingency approach of management, Decision Theory School.	10
2	Managerial processes, functions, skills and roles in an organization. Nature, process and technique of planning, Organizing, Staffing, Directing, Coordinating, Control.	10
3	Behaviour: Concept, Significance, Understanding and Managing individual behavior – Personality, Perceptions, Values, Attitudes, Learning, Work-motivation, Individual Decision Making and Problem solving.	10
4	Understanding and Managing Group Processes: Interpersonal and Group dynamics. Applications of emotional intelligence in organizations.Group decision making. Leadership and Influence Process : Concept, styles and Theories.	8
5	Managing Organizational Systems, Organizational Conflict – sources, pattern levels and types of conflict. Organizational design and structure. Work stress.	7

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1 : To understand the concept of Management.

CO2 : Demonstrate the applicability of the concept of Management processes to understand the functioning of the organization.

CO3 : Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.

CO4: Analyze the complexities associated with management of the group behavior in the organization.

CO5 : Demonstrate the applicability to manage the organization.

Suggested Readings

1. Koontz, Harold, Cyril O'Donnell, and Heinz, Whelrich. Essentials of Management. New Delhi: Tata Mc Graw Hill.
2. Robbins, S.P. Organizational Behaviour. New Delhi: PHI.
3. Luthans, F. Organisational Behaviour. NewYork: Mc Graw Hill.

Sub Title: DATA STRUCTURE & ALGORITHMSLAB	
Sub Code: CS204PPC03	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. Understand and remember algorithms and its analysis procedure.
2. Introduce the concept of data structures through ADT including List, Stack, Queues.
3. To design and implement various data structure algorithms.
4. To introduce various techniques for representation of the data in the real world.
5. To develop application using data structure algorithms.
6. Compute the complexity of various algorithms.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• To implement the CPP program for Insert the valuesin Array. • To implement the CPP program for Delete the values in Array. • To implement the CPP program for Update the values in Array. • To implement the CPP program for Addition, Subtraction and Multiplications of the integer values in Array. • To implement the CPP program for Stringalgorithms. • To implement the CPP program for pattern matching instrings. • To implement the CPP program for insertion, deletion in one way LINK LIST. • To implement the CPP program for insertion, deletion in two way LINK LIST. • To implement the CPP program for insertion, deletion in circular LINK LIST. • To implement the CPP program for insertion, deletion in doubly LINK LIST. • To implement the CPP program for insertion, deletion in header LINK LIST. • To implement the CPP program for insertion, deletion in header doubly LINK LIST. • To implement the CPP program for TREE structure. • To implement the CPP program for pre-order, in-order, post-order of any Binary TREE. • To implement the CPP program for Binary search. • To implement the CPP program for Quick short. • To implement the CPP program for insertion sort. • To implement the CPP program for Bubble short etc	18

LAB OUTCOMES: The students would have learnt

CO1: Select appropriate data structures as applied to specified problem definition.
CO2: Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
CO3: Students will be able to implement Linear and Non-Linear data structures.
CO4: Implement appropriate sorting/searching technique for given problem.
CO5: Design advance data structure using Non- Linear data structure.
CO6: Determine and analyze the complexity of given Algorithms.

Text Books:

1. Data Structures and Algorithm Analysis in C++, 2/e by Mark Allen Weiss, Pearson Education
2. Wirth Niclaus , Algorithm + Data Structure Programs, PHI
3. Fundamentals and Data Structure, by Horwitz E. and Sahani S., Computer Science Press.
4. Threat of Computer Programming, by Knuth D., Vol 1-2 Addision - Wesley
5. Data Structure and Algorithms, by Aho A.V.Hopcraft and Ullman J.E., addsion Wesley.

Reference Books:

1. Data Structure with Pascal, Tanonbaum , A. M. and Augenstein , M.J. PHI.
2. Data Structure using Pascal, by Trambley and SorensonMGH.
3. Data Structure with Abstract Data Type and Modula by Stubbs D. 2", Brooks & Cole Publication Comp.

Sub Title: OPERATING SYSTEM LAB	
Sub Code: CS204PPC04	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To learn Unix commands and shell programming
2. To implement various CPU Scheduling Algorithms
3. To implement Process Creation and Inter Process Communication.
4. To implement Deadlock Avoidance and Deadlock Detection Algorithms
5. To implement Page Replacement Algorithms
6. To implement File Organization and File Allocation Strategies.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Basics of UNIX commands • Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir • Write C programs to simulate UNIX commands like cp, ls, grep, etc. • Shell Programming • Write C programs to implement the various CPU Scheduling Algorithms • Implementation of Semaphores • Implementation of Shared memory and IPC • Bankers Algorithm for Deadlock Avoidance • Implementation of Deadlock Detection Algorithm • Write C program to implement Threading and Synchronization Applications	18

LAB OUTCOMES: The students would have learnt

CO1: Compare the performance of various CPU Scheduling Algorithms
CO2: Implement Deadlock avoidance and Detection Algorithms
CO3: Implement Semaphores
CO4: Create processes and implement IPC
CO5: Analyze the performance of the various Page Replacement Algorithms
CO6: Implement File Organization and File Allocation Strategies

Text Books:

1. Operating System concepts, Milenkovic M., MGH
2. Operating System design and implementation, Tanenbaubm A. S., PHI
3. Operating system concepts, Silberschartz A.and Patterson J.I. ,Wisley.

Reference Books:

1. Operating System, Stilling William, Maxwell McMillan International Edition 1992.
2. An introduction to operating system, Dectel H.N., , Addision Wisley.

Sub Title: ELECTRONIC DEVICE & CIRCUITS LAB	
Sub Code: CS204PES07	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To identify and test various electronic components
2. To use DSO for various measurements
3. To plot the characteristics of diode and transistor
4. To design and implement feedback amplifier circuits.
5. To measure the frequency of oscillators.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• To draw the characteristics of a semiconductor p-n junction diode and to find cut-in voltage, reverse resistance, static resistance and dynamic resistance. • To design a half wave rectifier and to determine its efficiency and ripple factor. • To design a centre tap full wave rectifier and determine the ripple factor and efficiency. • To design a bridge full wave rectifier and determine the ripple factor and efficiency. • To draw the characteristics of CE configuration of a transistor amplifier. • To draw the characteristics of CB configuration of a transistor amplifier. • To draw the characteristics of CC configuration of a transistor amplifier. • To draw the characteristics of JFET (N-channel / P- Channel). • To draw the characteristics of MOSFET (Depletion Type / Enhancement Type). • To draw Static input and output characteristics curves of CE transistor and determine its h-parameter values. • To draw Static input and output characteristics curves of CC transistor and determine its h-parameter values.	18

	• Study of various topologies of feedback amplifier. • To Design Wein Bridge Oscillator and determine the frequency of Oscillation. • To Design RC phase shift oscillator and determine the frequency of Oscillation.	

LAB OUTCOMES: The students would have learnt

CO1: Understand the diode and transistor characteristics.
CO2: Verify the rectifier circuits using diodes and implement them using hardware.
CO3: Design various amplifiers like CE, CC, common source amplifiers and implement them using hardware and also observe their frequency responses
CO4: Understand the construction, operation and characteristics of JFET and MOSFET, which can be used in the design of amplifiers.
CO5: Know the concept of feedback amplifier and their characteristics
CO6: Design the different oscillator circuits for various frequencies

Text Books:

1. Lab Manual of Basic Electronics by Paul B Zbar, TMH
2. Laboratory Manual for Electronic Devices and Circuits, 4th Ed., David A. Bell, PHI
3. Electronic Devices and Circuit Theory, Robert L. Boylestad & L. Nashelsky, K. L. Kishore, 9th Edition, PHI
4. Integrated Electronics: Analog & Digital Circuit Systems, Jacob Millman & Halkias, Tata McGraw Hill.
5. Microelectronics, Millman and Grabel, Tata McGraw Hill.
6. Integrated Circuits by K. R. Botkar, 9th Ed., Khanna Publicationso

Reference Books:

1. Electronic Devices & Circuits, Allen Mottershead, PHI.
2. Microelectronic Circuits, Sedra and Smith, 5th Edition, Oxford University Press.
3. Operational Amplifiers by R. Gayekwad, 4th Ed., Pearson Education

Sub Title: MICROPROCESSOR AND INTERFACES		
Sub Code: CS205TES05	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- To describe the basic architecture of 8086.
- To discuss the Instruction set of 8086.
- Evaluate the different technique of interfacing with memory and IO devices.
- Develop knowledge about interfacing devices and peripheral devices.
- To describe the basic architecture of 80386 and co-processor.

UNIT No	Syllabus Content	No of Hours
1	Microprocessor Architecture -8086, Register organization of 8086, Signal descriptions of 8086 chip, Physical Memory organization, Introduction to Maximum and Minimum mode operation, Processor 8088.	8
2	Instruction formats, addressing modes, Instruction Set of 8086: Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Shift and rotate instructions, String Manipulation instructions, Machine Control Instruction, Flag Manipulation Instruction, Assembler Directive and Operators, Programming with an Assembler, Programming examples.	7
3	Introduction to Stack, Stack Structure of 8086, Interrupt, Interrupt and Interrupt Service Routines, Non Maskable Interrupt, Maskable Interrupt. Subroutine, MACROS: Defining a MACRO, Passing Parameters to MACRO.	7
4	Memory Interfacing, Interfacing I/O Ports, Programmable Interval Timer 8253: Architecture and Signal Description, Operating modes, Programming and Interfacing 8253, DMA Controller 8257: Architecture and Signal Description, Keyboard/Display Controller 8279: Architecture and Signal Description, Mode of Operation, Floppy Disk Controller 8272: Architecture and Signal Description, Commands.	7
5	Multi microprocessor System: Numeric Processor 8087, IO Processor 8089. 80386: Features, Architecture and Signal Description, Register Organization, Real Mode, Protected Mode, Virtual Mode, Paging, Segmentation.	7

COURSE OUTCOMES: The students would have learnt

CO1. Learn about the basic architecture of 8086.
CO2. Develop a skill to do assembly language programming.
CO3. Learn to do interfacing with memory & IO devices.
CO4. Develop a understanding about the peripheral devices.
CO5. Learn about the basic of 80386 microprocessor & co-processor.

Text Books:

1. Advanced Microprocessors and Peripherals – Architecture, Processing and Interfacing : A.K. Ray, K.M. Bhurchandi
2. Microcomputer System 8086/8088 Family – Architecture Programming and design: Y Liu and G. A. Gibson: Prentice Hall
3. 80386 Microprocessor Handbook C.H. Pappas and W. H. Murray: Osborne McGraw Hill

Reference Books:

1. Microprocessor Architecture Programming and Application: R.C. Gaonkar: Wiley Eastern.
2. Microprocessor 8086, 80386 & Pentium, Barry B. Brey

Sub Title: Relational Data Base Management System		
Sub Code: CS205TPC08	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- To describe a sound introduction to the discipline of database management systems.
- To give a good formal foundation on the relational model of data and usage of Relational Algebra.
- To introduce the concepts of basic SQL as a universal Database language.
- To enhance knowledge to advanced SQL topics like embedded SQL, procedures connectivity through JDBC.
- To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure. Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.	8
2	**Relational Data Model and Language:** Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus, Introduction to SQL: Characteristics of SQL. Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.	7
3	**Data Base Design & Normalization:** Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.	7
4	**Transaction Processing Concepts:** Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log-based recovery, checkpoints, deadlock handling.	7

5	**Concurrency Control Techniques:** Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation-based protocol, multiple granularities, Multi version schemes, Recovery with concurrent transaction.	7

COURSE OUTCOMES: The students would have learnt

- CO1. Explain the features of database management system and relational database
- CO2. Design conceptual models of a database using E-R modeling for real life applications & construct queries in Relational Algebra
- CO3. Create & populate a RDBMS for a real-life application, with constraint & keys using SQL.
- CO4. Retrieve any type of information from a database by formulating complex queries in SQL
- CO5. Analyze the existing design of database schema & apply concept of normalization to design an optimal database.

Text Books:

1. Date C J, "An Introduction to Database System", Addison Wesley
2. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addison Wesley
4. Leon & Leon, "Database Management System", Vikas Publishing

Reference Books:

1. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
2. Majumdar & Bhattacharya, "Database Management System", TMH
3. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill
4. Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson Education.
5. Maheshwari Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi

Sub Title: FORMAL LANGUAGE AND AUTOMATA THEORY		
Sub Code: CS205TPC09	No. of Credits: =3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- To learn fundamentals of Regular and Context Free Grammars and Languages
- To understand the relation between Regular Language and Finite Automata and machines.
- To learn how to design Automata's and machines as Acceptors, Verifiers and Translators.
- To understand the relation between Contexts free Languages, PDA and TM.
- To learn how to design PDA as acceptor and TM as Calculators.
- To learn how to correlate Automata's with Programs and Functions.

UNIT No	Syllabus Content	No of Hours
1	**Finite Automata & Regular Expression:** Deterministic and Non-deterministic Finite automata, Regular Expression, two-way finite automata, Finite automata with output, Properties of regular set, Pumping lemma, Closure properties.	8
2	**Context Free Grammars (CFG):** Introduction of CFG, Derivation trees, Simplification of normal forms, CNF, GNF, Regular Grammars, UnrestrictedGrammars and Relations between Classes of languages.	7
3	**Push Down Automata:** Introduction of PDA, Definitions relationship between PDA and Context Free Languages, properties of CGL's, Decision Algorithms.	7
4	**Turing Machine:** The Turing machine model, Computable languages andfunctions, Modification of Turing machines, Church's Hypothesis	7
5	**Recursive and Recursive Enumerable Languages:** Properties of recursive and recursive enumerable languages Universal Turing machine, Undesirability Post correspondence problem, Introduction to Recursive function theory.	7

COURSE OUTCOMES: The students would have learnt

- CO1. Understand, design, construct, analyze & interpret Regular languages, Expressions and Grammers.
- CO2. Design different types of Finite Automata &machines as Acceptor, Verifier & Translator.
- CO3. Understand, design, analyze & interpret Context Free Languages, Expression & Grammers.
- CO4. Design different types of Push Down Automata as Simple Parser.
- CO5. Design different types of Turing machines as Acceptor, Verifier, Translator & basic Computing Machine.

Text Books:

1. Introduction to Automata Theory Languages and Computation, Hopcroft and Ullman, Narosa.
2. Theory of Computer Science, Mishra and Chandra shekharan, PHI.

Reference Books:

1. Theory of Computer Science, Kohan, John Wiley.
2. Theory of Computer Science, Korral
3. Introduction to Automata Theory Languages and Computation, Hopcroft and Ullman, Addison Wesley
4. Introduction to Languages & Theory of Computation, Martin, , TMH

Sub Title: PARALLEL COMPUTING		
Sub Code: CS205TPC10	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- To introduce parallel, distributed and cloud computing, the major concept, ideas & various hardware model of parallel & distributed system.
- To study design the multiprocessor system by various interconnection network like static & dynamic etc.
- To study various technique for vector pipeline architecture design to achieve parallelism(concurrency).
- To study about advanced & more powerful processor technology.
- To study about parallel algorithm design, programming language & tools like Python, CUDA. To study about architecture design of GPU.

UNIT No	Syllabus Content	No of Hours
1	**Introduction Of Parallelism:** Introduction -parallelism in Uniprocessor systems, Principles of Scalable Performance, architectural classification schemes, SISD, SIMD, MISD, MIMD architectures, multiprocessor and multicomputer, UMA, NUMA, COMA, NORMA model Parallel algorithms: Various Sorting	8
2	**Parallel Models & Interconnection Network:** System Interconnect architecture – static, dynamic, multistage interconnection networks, design considerations throughputs, delay, blocking and non-blocking properties interconnected memory organization - C-Access, S-Access, C-S access.	7
3	**Pipeline & Vector Processing:** Principal of Pipelining - Over lapped parallelism, principal of Liner pipelining processor, General pipelining and reservation tables, arithmetic pipelining, Design of pipeline Instruction units, arithmetic pipelining design example, hazard detection and resolution, JOB sequencing and collision prevention, vector processing function organization of instructions in IBM 360/91.	7
4	**Advanced Processor and Parallelism:** Advanced processor technology – RISC & CISC computers, super scalar architecture, principles of multithreading, multithreaded architectures of MP systems. Context switching policies, shared variables, locks, semaphores, monitor, multitasking and Cray multiprocessor.	7

5	**Parallel Programming Design Coding and Debugging:** CPU parallelism, GPU parallelism-program, Exploiting parallelism in programmed multidimension -al arrays, directed acyclic graphs, distance and direction vectors, data flow computer and data flow graphs. Parallel algorithm structure, analyzing parallel algorithm. Elementary parallel algorithms, Programming: Parallel programming with Synchronous and Asynchronous, Various API of MPS, PYTHON, CUDA, OpenCL	7

COURSE OUTCOMES: The students would have learnt

CO1: Spontaneously able to design the multiprocessor system with various hardware electronics circuit like CU, ALU, RAM etc.
CO2: Design new interconnection network which connects the processors and other devices like input and output devices (I/O)
CO3: Spontaneously try and invented a new type of pipeline processor architecture in which throughput can be as better as possible than all other.
CO4: How do combine the techniques of parallelism to obtain a more power full architecture as a outcome.
CO5: Course outcomes are skills and abilities to make parallel algorithm and program to enhance the speed up of execution of process.

Text Books:

1. Computer Architecture & Parallel processing - Kai Hwang 7 Briggs. (MGH).
2. Advanced Computer Architecture with Parallel Programming", K. Hwang, MGH.
3. Quinn, Parallel computing – theory and practice, Tata McGraw Hill.
4. Sima and Fountain, Advanced Computer Architectures, Pearson Education
5. Ed. Afonso Ferreira and Jose' D. P. Rolin, Parallel Algorithms for irregular problems - State of the art, Kluwer Academic Publishers

Reference Books:

1. Parallel Computers: Arch.& Prog., Rajaraman & Siva Ram Murthy, PHI.
2. Parallel computing- Theory and practice - Michael J Quinn- Mc Graw Hill
3. Selim G. Akl, The Design and Analysis of Parallel Algorithms, PH International.

Sub Title: SOFTWARE ENGINEERING		
Sub Code: CS205TPE01	No. of Credits :3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- To discuss the fundamental concepts of Software Engineering.
- To discuss the Various Models of Software.
- Acquire skills and knowledge to advance their career, including continually upgrading professional, communication, analytic, and technical skills.
- To Learn the ability to work effectively as a team member and/or leader in an ever-changing professional environment
- Learn to develop a small Software.

UNIT No	Syllabus Content	No of Hours
1	**Software Engineering:** What is software, Evolution of Software, Characteristics of software, Types of Software, Applications of software, Layered Technology. **Software Process Models:** Linear Sequential model, Prototype model, RAD model, Incremental model, Spiral Model, Component Based Development Model.	8
2	**Managing Software Project** **The Management Spectrum:** People, Product, Process, Project. Software Process and Project Metrics – Measures and Metrics, Software Measurement- Size Oriented Metrics, Function Oriented Metrics, Metrics for Quality-Overview, Measuring Quality, DRE. Software Requirement Specification-Problem Analysis, Requirement Specification. Validation and verification, The Make /Buy Decision.	7
3	**System Design:** Introduction, design principles, Problem partitioning, abstraction, top-down and bottom-up design, Low level Design: Modularization, Structure Chart, Flow chart, Functional versus Object oriented approach, design specification, Design verification, monitoring and control.	7
4	**Coding:** Top–down and bottom-up structured programming, information hiding, programming style, internal documentation, verification, monitoring and control. **Software testing:** Software Testing fundamentals, white box testing, Basis path testing, Cyclomatic Complexity, A strategic Issues, Unit testing, Integration testing, validation testing, System Testing.	7

5	**Software Project Management:** Cost estimation, project scheduling, Software configuration management, Quality assurance, Project Monitoring, Risk management.	7

COURSE OUTCOMES: The students would have learnt

CO1. The fundamentals of Software Engineering.
CO2. How to apply the Software Engineering Lifecycle.
CO3. Understand of different Software architectural styles & process framework.
CO4. Describe Software measurement & Software risks.
CO5. To develop a Project.

Text Books:

1. Software Engineering by Bharat Bhushan Agrawal, Sumit Prakash Tayal,

Reference Books:

1. Software Engineering by Pressmen
2. Software Engineering by Pankaj Jalote
3. Software Project Management by Manish Kumar Jha.

Sub Title: INFORMATION THEORY & CODING		
Sub Code: CS205TPE02	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- Introduce the principles and applications of information theory.
- To teach study how information is measured in terms of probability and entropy, and the relationships among conditional and joint entropies.
- To teach coding schemes, including error correcting codes.
- Explain how this quantitative measure of information may be used in order to build efficient solutions to multitudinous engineering problem

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Uncertainty, properties of information, Measures of information, Entropy: properties of entropy, information rate, conditional Entropy, Mutual Information.	8
2	**Channel Capacity:** Introduction, Shannon's Theorem, Continuous Channel, Capacity of Gaussian Channel: Shannon Hartley Theorem Bandwidth and S/N Trade-off.	7
3	**Channel Coding:** Introduction, Shannon-Fano Coding, Huffman Coding, Block Codes, Tree Codes, Cyclic Code, Hamming Codes, Convolutional Code.	7
4	**Compression:** Introduction, Types of Compression, Lossless and Lossy Compression, Binary Image Compression Schemes: Runlength Encoding, CCITT Groups, Video Compression.	7
5	**Cryptography:** Introduction, Types of Cryptosystems: Secret-key cryptosystem, Public-key cryptosystem, Encryption, Decryption, Ciphers and Secret Message, Cryptanalysis.	7

COURSE OUTCOMES: The students would have learnt

- CO1. Apply information theory in source coding and channel coding.
- CO2. Understand how error control coding techniques are applied in communication systems.
- CO3. Understand linear block codes for error detection and correction.
- CO4. Understand various error control encoding and decoding techniques.
- CO5. Students will understand the basic concepts of Cryptography.

Text Books:

1. Information Theory, Coding and Cryptography by Ranjan Bose, Tata McGraw-Hill Education.
2. Communication System by R. P. Singh, S. D. Sapre, Tata McGraw-Hill.
3. Information Theory and Coding Techniques by J.S. Chitode and P.G. Chilveri, Technical Publication.

Reference Books:

1. Elements of Information Theory" by T. M. Cover and J. A. Thomas, John Wiley & Sons, New York.
2. Information Theory, Coding and Cryptography" by R. Bose, TMH.

Sub Title: MOBILE COMMUNICATION		
Sub Code: CS205TPE03	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- Discuss the evolution of Mobile communication and cell concept to improve capacity of the system.
- Discuss the radio transmission of Mobile communication.
- Discuss the concept of GSM, DECT and TETRA.
- To know about infrastructure and infrastructure less network.
- Discuss the concept of mobility i.e. Mobile IP and TCP

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Applications: Vehicles, Emergencies, Business, Replacement of wired networks, Infotainment, Location dependent services. Mobile and wireless devices, history of wireless communication, Reference Model.	8
2	**Wireless Transmission:** Frequencies for Radio Transmission, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular System Medium Access Control Hidden And Exposed Terminals, Near and Far Terminals, SDMA, FDMA, TDMS, CDMA, Comparison Among Multiple Access Protocols.	7
3	**Telecommunications Systems:** GSM: Mobile Services, System Architecture, Radio Interface, Protocols, Localization and Calling, Handover, Security, New Data Services. Dect, Tetra	7
4	**Wireless Lan:** Infrared vs radio transmission, Infrastructure and ad-hoc network, **IEEE 802.11:** System architecture, protocol architecture, Physical layer, medium access control layer, MAC management, 802.11b, 802.11a, Newer developments, HIPERLAN, Bluetooth.	7
5	**Mobile Communication Layers:** Mobile network layer: Mobile IP, Goals, assumptions and requirements, Entities and terminology, IP packet delivery, Agent discovery, Registration, Tunneling and encapsulation, Optimizations, Reverse tunneling, IPv6. DHCP, Mobile Ad-hoc Routing, Mobile TCP, File System	7

COURSE OUTCOMES: The students would have learnt

CO1.	Understand the evolution of Wireless communication.
CO2.	Understand the concept of cellular system.
CO3.	Understand the working of GSM.
CO4.	Understand the infrastructure less network like Bluetooth.
CO5.	Understand the concept of Mobility in mobile communication.

Text Books:

1. Mobile Communications by J. Schiller, Addison Wesley
2. Mobile IP by Charles Perkins, Addison Wesley.

Reference Books:

1. Ad hoc Networks by Charles Perkins, Addison Wesley.
2. Understanding WAP by M. V. D. Heijden, M. Taylor, Artech House.

Sub Title: MULTIMEDIA SYSTEM DESIGN		
Sub Code: CS205TPE04	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- Understand technical aspect of Multimedia Systems.
- Discuss the standards available for different audio, video and text applications.
- Understand organization of multimedia database.
- Discuss various multimedia authoring systems.
- To develop multimedia application and analyse the performance of the same

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** An introduction, Multimedia elements, Multimedia Applications, Multimedia System Architecture, Evolving Technologies for Multimedia Systems, Defining Objects for Multimedia systems, Multimedia Data Interface Standard, The need for data Compression, Multimedia databases.	8
2	**Compression Techniques:** Compression and Decompression, Types of compression, Binary Image Compression schemes, Color, Gray Scale, Still-video image Compression, Video Image Compression, Audio Compression, Fractal Compression.	7
3	**Formats**: Data and Format Standards, Rich-text Format, TIFF File Format, Resource Interchange File Format (RIFF), MIDI File Format, JPEG DIB File Format for still and Motion Images, MPEG standards Pen Input, Video and Image Display systems, Print Output Technologies, Image Scanners, Digital Voice and Audio, Digital Camera, Video Images and Animation, Full-Motion Video.	7
4	**Storage:** Storage and Retrieval Technologies, Magnetic Media Technology, Optical Media, Hierarchical Storage Management, Cache management for storage systems, Multimedia Application Design, Multimedia application classes, Types of multimedia systems, Components of multimedia systems, Organizing multimedia databases.	7

5	**Multimedia Design:** Unified Communication, video conferencing and Chat, Multimedia Authoring and User Interface, Multimedia authoring system, Hypermedia application design consideration, User interface design, Object display/playback issues, Multimedia Operating Systems introduction, real time, Resource management, process management, file systems.	7

COURSE OUTCOMES: The students would have learnt

CO1.	Various technical aspect of Multimedia systems.
CO2.	Various file formats for audio, video & text media.
CO3.	Develop various Multimedia systems applicable in real time.
CO4.	Concept of storage management of Multimedia system.
CO5.	To evaluate multimedia application for its optimum performance.

Text Books:

1. Multimedia System Design by Prabhat K. Andleigh & Kiran Thakrar, Prentice PTR, NJ.
2. Multimedia: computing communications and applications by Ralf Steinmetz and Klara Nahrstedt, Innovating technology series by Pearson Edu. Asia.

Reference Books:

1. Multimedia Communications, Directions & Innovations by Jerry D. Gibson, HarcourtIndia Pvt. Ltd.
2. Multimedia computing by Borko, Handbook of CRC Press.
3. Multimedia Applications Development by Mark J. Bunzel Sandra K. Morris, McGraw Hill.
4. Fundamentals of Multimedia by Ze-Nian Li, Mark S. Drew, by Pearson Edu. Asia

Sub Title: RELATIONAL DATA BASE MANAGEMENT SYSTEM LAB	
Sub Code: CS205PPC05	No. of Credits: 1.5=0: 0: 1.5(L-T-P)
Exam Duration: 3 hours	IA+ESE =30+20

Lab Objective:

- To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques & product-specific tools.
- To familiarize the participant with the nuances database environment towards information-oriented data processing-oriented framework
- Give a good formal foundation on the relational model of data.
- To prevent SQL and procedural interface to SQL comprehensively.
- To give an information to systematic database design approaches covering conceptual design, logical design and all overview of physical design.

UnitNo.	Syllabus Content	Teaching Hours
I, II, III, IV and V	• Write the queries for Data Manipulation and Data DefinitionLanguage. • Write SQL queries using logical operations and operators. • Write SQL query using group by function. • Write SQL queries for group functions. • Write SQL queries for sub queries, nested queries. • Write a program by the use of PL/SQL. • Write SQL queries to create views. • Write an SQL query to implement JOINS. • Write a query for extracting data from more than one table. • Write a query to understand the concepts for ROLL BACK,COMMIT & CHECK POINTS.	18

LAB OUTCOMES: The students would have learnt

- Understand, appreciate and effectively explain the underlying concepts of database technologies.
- Design and implement a database schema for a given problem domain normalize a database.
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraint on a database using a state-of-the-art RDBMS.
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.

Text Books:

1. An Introduction to Database System, Date C J, Addision Wesley
2. Database Concepts, Korth, Silbertz, Sudarshan, McGraw Hill
3. Fundamentals of Database Systems, Elmasri, Navathe, Addision Wesley
4. Database Management System, Leon & Leon, Vikas Publishing House.

Reference Books:

1. An introduction to Database Systems, Bipin C. Desai, Galgotia Publication
2. Database Management System, Majumdar & Bhattacharya, TMH
3. Database Management System, Ramakrishnan, Gehrke, McGraw Hill
4. Database Processing: Fundamentals, Design and Implementation, Kroenke, Pearson Education.
5. DBMS: Complete Practical Approach, Maheshwari Jain, Firewall Media, New Delhi

Sub Title: PARALLEL COMPUTING LAB	
Sub Code: CS205PPC06	No. of Credits: 1.5=0: 0: 1.5(L-T-P)
Exam Duration: 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

- To study about various platform and libraries of parallel processing.
- To study about to create MPI programs to accomplish a computational task
- To study about of API to carried out MPI
- To study about to know GPU importance in parallel programming
- To study about of shared memory in parallel

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Understanding the environment of OMP, MPI, CUDA • Parallel programming environment and platform. • Create and simulate multiple processes and threads on MP system. • Simulate parallel program to synchronization and pooling ofprocesses. • Simulate the loop and function in parallelism manner. • Simulate a parallel algorithm to perform some mathematicalcalculation and their execution time. • Simulate the parallel sorting algorithm and their execution time. • Simulate the parallel searching algorithm and their execution time. • Simulate parallel some operation on array and list with theirexecution time. • Optimization technique using shared memory module on MPsystem. • Heterogeneous calculation using PYTHON (PTK), CUDA, andOPENCL tool kit.	18

LAB OUTCOMES: The students would have learnt

- Simulate and create process & threads.
- Simulate parallel algorithm using various MPI.
- Simulate parallel program for many computational tasks.
- Simulate various memories to carry out optimization.
- Do synchronous and asynchronous of process and pooling.

Text Books:

1. Programming Massively Parallel Processors: A Hands-on Approach Paperback – 20 December 2012 by David B. Kirk , Wen-mei W. Hwu
2. Introduction to Parallel Algorithms 1st Edition by Joseph JaJa.

Reference Books:

1. Python Parallel Programming Cookbook Paperback – August 26, 2015 by Giancarlo Zaccone

Sub Title: DESIGN AND ANALYSIS OF ALGORITHMS		
Sub Code: CS206TPC11	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- To Analysis efficiency of algorithms on the basis of their time complexity and space complexity by mathematically foundation (asymptotic notation)
- To study about design and analysis of divide and conquer and greedy algorithm on the basis of their attributes and also describe when could be used these technique and which situation for which problem
- To know dynamic programming(DP) paradigm and algorithm for problems on the different data structure like graph and array
- Know a branch and bound technique and backtracking technique for problems
- Know the classes of problems like P,NP on their basis of nature (running time complexity)

UNIT No	Syllabus Content	No of Hours
1	**Algorithms Analysis:** Space and Time Complexity, Asymptotic Notations, mathematical foundations: growth functions, complexity analysis of algorithms, Recursive algorithms, analysis of no-recursive and recursive algorithms, Recurrences equation and their solution. Master method, recursive tree and backward substitution method.	8
2	**Divide & Conquer and Greedy Method:** Divide and conquer-Finding Maxima and Minima Binary search, Merge Sort, Quick Sort, and selection sort. Stassen's Matrix multiplication Greedy method-introduction, Knapsack problem, travelling sales person problem, Minimum Spanning trees- kruskal's algorithm, prim's algorithm, Single source shortest path-Dijkstra's algorithm, Huffman codes.	7
3	**Dynamic Programming and Search Techniques:** Dynamic Programming: Introduction, Matrix chain multiplication, Single source shortest path-Bellman-Ford, all pairs shortest path, optimal binary search tree, o/1 knapsack problem, travelling sales person problem, longest common subsequence Search techniques: Techniques for binary trees, techniques for graphs –DES and BFS, connected components, Bi-connected components, and Strongly- connected components, Topological sorting.	7

	Heap Data Structure: Min and Max Heap, Fibonacci Heap, Binomial heap, Amortized Analysis, Heap sort.	
4	**Back Tracking and Branch and Bound:** Backtracking: Back tracking and Recursive back tracking, applications of back tracking paradigm, the 8-queen problem, graph coloring, Hamiltonian cycles. **Branch and Bound:** introduction, 0/1 knapsack problem, travelling sales person problem, Least Cost (LC) search – the 15-puzzle problem.	7
5	**Complexity Class Theory and Pattern Matching:** Problem classes, Optimization problem, decision making problem, P VS NP VS NPC VS NPH, Venn diagram and their analysis, deterministic and non-deterministicpolynomial time algorithm, Cook Levin theorem, Verification algorithms forsome NP Class: subset sum problem, clique problem, vertex cover,independent set problem, Circuit Satisfiability problem, 2-SAT, 3-SAT etc. Pattern matching: Basic concept of pattern reorganization and their algorithms.	7

COURSE OUTCOMES: The students would have learnt

CO1: Technique to calculate and obtain the running time complexity and space complexity of any kind of algorithm.
CO2: Design divide and conquer and greedy algorithm for problems and at the same time they will able to know that which data structure are adequate to enhance the running time complexity.
CO3: Spontaneously able to described and analyze the dynamic-programming (DP) algorithm moreover when an algorithmic design situation calls for it and can construct a new DP algorithm for given a particular problem.
CO4: Spontaneously able to construct and design branch & bound and backtracking algorithm for a particular problem on the basis of the problem nature analysis and requirement.
CO5: Analyzed and write verification algorithm for some NP and NPH class problems.

Text Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, Clifford Stein, "Introduction to Algorithm", Publisher PHI. ISBN 81-203-2141-3
2. Sanjoy Dasgupta, Christos H. Papadimitriou and Umesh V. Vazirani, Algorithms, Tata McGraw-Hill, 2008
3. Jon Kleinberg and Éva Tardos, Algorithm Design, Pearson, 2005.
4. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Interne Examples, Second Edition, Wiley, 2006.

Reference Books:

1. Udi Manber, Algorithms – A Creative Approach, Addison-Wesley, Reading, MA, 1989.
2. Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1997.

Sub Title: JAVA		
Sub Code: CS206TPC12	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- To discuss the fundamental concepts of OOPs and Java
- To discuss the Differences between C/C++ and Java.
- Knowledge of Multithreading, Packages and Applet.
- Use of Java on different Platform.
- Learn to develop a small project using Java

UNIT No	Syllabus Content	No of Hours
1	**Java Fundamentals:** Basic Concepts of Object-Oriented Programming, Java History, Java Features, How Java Differs from C and C++, Web Browsers, Java Environment, Java Program Structure, Java Tokens, Installing and Configuring Java, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style.	8
2	Constants, Variables and Data Types, Declaration of Variables, Giving values to variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values, Java Operators, Arithmetic Expression, Evaluation of Expressions, Precedence of Arithmetic Operators, Operator Precedence and Associativity, Mathematical Functions, Control Statements (if statement, switch statement and Conditional operator statement), Decision Making and Looping (while construct, do construct, for construct), Jumps in Loops.	7
3	**Class, Objects and Methods:** Introduction of Class, defining a Class, Fields Declaration, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, **Inheritance:** Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Abstract Methods and Classes, Visibility Control **Introduction of Array:** One Dimensional Array, Creating an array, Two-Dimensional arrays, Strings, Wrapper Classes. **Interfaces:** Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables, **Packages:** Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes, Static Import.	7

4	**Introduction to Multithreaded Programming:** Difference between Multithreading and Multitasking, Creating threads, Extending the thread class, Stopping and Blocking a thread, Life Cycle of a thread, Using thread Methods, Thread Exception, Thread Priority, Synchronization, Implementing the Runnable Interface, Inter-thread Communication. Managing Errors and Exceptions: Types of Errors, Exceptions, Syntax of	7
5	Introduction of Applet Programming, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable Applet, designing a Web Page, Applet Tag, Adding Applet to HTML file, Running the Applet, Passing Parameters to Applets, Aligning the Display, Displaying Numeric values, Getting input from the user, Event handling, Introduction of Graphics Programming, Introduction to AWT package, **Managing Input/Output Files in Java:** Concept of Streams, Stream Classes, Byte Stream Classes, Character Stream Classes, Other useful I/O classes, Using the file class, Input/Output exceptions. .	7

COURSE OUTCOMES: The students would have learnt

CO1.	Understanding of basic concept of java programming.
CO2.	Knowledge of the structure of java.
CO3.	The concept of Exception handling, Package and Applet.
CO4.	To use the Java programming language for various programming technologies.
CO5.	To develop a Software in the Java programming language.

Text Books:

1. E. Balagurusamy, Programming with Java A Primer, Fourth Edition, McGrawHill, 2010.

Reference Books:

1. H. Schildt, Java TM 2: The Complete Reference, Fourth Edition, Tata McGraw-Hill, 2001.
2. K. A. Mughal and R. W. Rasmussen, A Programmer's Guide to Java TM SCJP
3. Certification A Comprehensive Primer, Third Edition, Addison Wesley, 2008

Sub Title: DIGITAL IMAGE PROCESSING		
Sub Code: CS206TPC13	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE: The students would have learnt

- To discuss the fundamental concepts of digital image processing.
- To discuss the various image, transform with respect to basic functions, properties and application.
- To discuss image enhancement technique in spatial and frequency domain.
- To discuss image segmentation and restoration technique in spatial and frequency domain.
- To discuss the simple image processing techniques.

UNIT No	Syllabus Content	No of Hours
1	**Digital Image Fundamentals:** Background, digital image representation, examples of field that use DIP, fundamental steps in digital image processing, Simple image model, basic relationships between pixels: neighborhood of a pixel, Connectivity, Basic transformations: translational, rotational, scaling. Color models and transformations, Pseudo color Image Processing.	8
2	**Image Transforms:** Introduction to 2D Transforms: Fourier Transform and Properties, DCT and Properties, Hadamard Transform and Properties and properties **Image Compression:** Fundamentals, image compression models, elements of Information theory, Image Compression: lossy and non-lossy compression, image compression standards.	7
3	**Image Enhancement Spatial Domain:** Background, Basic gray level transformations, histogram: Computation histogram , histogram specification, histogram equalization, enhancement using arithmetic/logic operations, basics of spatial filtering, smoothing sharpening spatial filters, combining spatial enhancement methods. **Edge Detection Methods:** Prewitt, Sobel and Robert **Frequency Domain:** Background, introduction to the frequency domain, smoothing and sharpening frequency domain filters, homomorphic filtering, generation of spatial masks from frequency domain specifications.	7
4	**Image Segmentation:** Detection of discontinuities, edge linking & boundary detection, thresholding, Region based segmentation, morphological water sheds, the use of motion in segmentation	7

5	**Image Restoration:** Degradation model, Noise models, restoration in the presence of noise only (Spatial and frequency domain filters), Inverse filtering, LMS filtering, Wiener filter, constrained least square restoration, interactive restoration, restoration in the spatial domain	7

COURSE OUTCOMES: The students would have learnt

CO1.	Understanding of basic image processing techniques.
CO2.	Image analysis using 2-D image transforms.
CO3.	Image enhancement technique in spatial and frequency domain.
CO4.	Image processing application such as compression, segmentation and restoration.
CO5.	Learn to apply different image processing technique.

Text Books:

1. Digital Image Processing, R C Gonzalez & R E Woods, PearsonEducation,3 edition.
2. Digital Image Processing and Computer Vision, Milan Sonka, Cengage learning, First edition.

Reference Books:

1. Digital Image Processing, S. Jayaraman, S. Esakkirajan, T. Veera Kumar, Tata McGraw Hill, 2009.
2. Fundamentals of Digital Image processing, A K Jain, PHI/PearsonEducation,1989.
3. Digital Image Processing, Sid Ahmed, McGraw Hill.

Sub Title: MANAGEMENT INFORMATION SYSTEM		
Sub Code: CS206TPE05	No. of Credits: 3=3: 0: 0 (L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
- To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
- To enable students understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
- To enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.
- To provide the theoretical models used in database management systems to answer business questions.

UNIT No	Syllabus Content	No of Hours
1	**Information System:** Introduction of Information System, Fundamentals of Information System, Strategic Role of Information in Organization and Management, three dimensions of Information System, Information System and Organization, Business Process Re-Engineering, Traditional and Computer based information system.	8
2	**Decision Support System:** Integration of Information, Types of Decision making in Organization, Decision Making Process, Models and Decision Support, Decision in business Areas, Strategic Analysis	7
3	**Information System Planning**: Types of Controlling Information System, Development of MIS Methodology and Tools/Techniques for Systematic Identification, Evaluation, Modification of MIS, Information System Success and Failure Implementation	7

4	**Information System for Business Operations:** Cross Functional Information System, A study of major Financial, Production, Human Resource Information System and Marketing Information System.	7
5	**Security and Auditing of Information System:** Management of Information System and End-User Computing, Security and Ethical issues of Information System, Major issues in Information System, Auditing of Information System.	7

COURSE OUTCOMES: The students would have learnt

CO1. Relate the basic concepts and technologies used in the field of management information systems.
CO2. Compare the processes of developing and implementing information systems.
CO3. Outline the role of the ethical, social and security issues of information systems.
CO4. Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
CO5. Apply the understanding of how various information systems like DBMS work together to accomplish information objectives of an organization.

Text Books:

1. Management Information System: A Contemporary Perspective, Kenneth C. Laudon and Jane Price Loudon, Maxwell Macmillan International Editions.

Reference Books:

1. Management Information System: Solving Business Problems with Information Technology, Gerald V. Post and David L. Anderson, Tata McGraw – Hill Edition
2. Management Information System: Managing Information Technology in the Internet worked Enterprise, James A. O'Brien Tata McGraw –Hill Edition, Fourth Edition.

Sub Title: ROBOTICS		
Sub Code: CS206TPE06	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- Learn the basic concepts of Robots.
- Learn the concepts of Kinematics of Robotics.
- Learn the concepts of Motions, velocities and dynamic analysis of force.
- Learn the concepts of Motion and Trajectory planning.
- Learn the concepts of Potential Functions, Visibility Graphs and Coverage Planning.

UNIT No	Syllabus Content	No of Hours
1	Introduction to Robotics Evolution of robots and robotics, progressive advancement in robots, definitions and classifications, laws of robotics, robot anatomy and related attributes, human arm characteristics, robot control system, manipulation and control, sensors in robotics, robots programming, the future prospects.	8
2	10 Coordinate Frames, Mapping and Transforms Robot specification and notations, Coordinate frames, description of objects in space, transformation of vectors, inverting a homogeneous transform, fundamental rotation matrices, yaw pitch and roll, yaw pitch and roll transformation, equivalent angle.	7
3	Symbolic Modelling of Robots – Direct Kinematic Model Mechanical structure and notations, description of links and joints, kinematic modelling of the manipulator, Denavit – Hartenberg notation, kinematic relationship between adjacent links, manipulator, transformation matrix, introduction to inverse kinematic model, Artificial Intelligence in robotics.	7
4	Robotic Sensors and Vision The meaning of sensing, sensors in robotics, kinds of sensors used in robotics, robotic vision, industrial applications of vision- controlled robotic systems, process of imaging, architecture of robotic vision systems, image acquisition, description of other components of vision system, image representation, image processing.	7

5	Robot Applications Industrial applications, material handling, processing applications, assembly applications, inspection, application, principles for robot application and application planning, justification of robots, robot safety, non-industrial applications, robotic application for sustainable development & social issues.	7

COURSE OUTCOMES: The students would have learnt

CO1. Apply the basic concepts of Robots.
CO2. Apply and evaluate the concepts of Kinematics of Robotics.
CO3. Apply the Motions, velocities and dynamics analysis of force.
CO4. Apply and evaluate Motion and trajectory planning.
CO5. Apply the concepts of potential functions, visibility graphs and coverage planning.

Text Books:

1. Robotics & Control – R.K. Mittal & I.J. Nagrath – TMH Publications
2. Robotics for engineers –Yoram Korean- McGrew Hill Co.
3. Industrial Robotics Technology programming and Applications –M. P. Groover, M. Weiss.
4. Robotics Control Sensing, Vision and Intelligence –K. S. Fu, R. C. Gonzales, C. S. G. Lee-McGrew Hill Book co.

Reference Books:

1. Kinematics and Synthesis of linkages –Hardenberg and Denavit– McGrew Hill Book Co
2. Kinematics and Linkage Design – A.S. Hall – Prentice Hall
3. Kinematics and Dynamics of Machinery–J. Hirschhorn– McGrew Hill Book Company

Sub Title: ARTIFICIAL INTELLIGENCE		
Sub Code: CS206TPE07	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- To create appreciation and understanding of both the achievements of AI and the theory underlying those achievements.
- To introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems
- To review the different stages of development of the AI field from human like behavior to Rational Agents.

UNIT No	Syllabus Content	No of Hours
1	Introduction of Artificial Intelligence(AI), Difference between Intelligence and Artificial Intelligence, Definitions of AI, Strong AI and Weak AI, Application areas of AI, Comparison of Conventional and AI Computing, History of AI, Turing Test, Branches of AI, Intelligent Agents, State Space Representation, Production System, Heuristic Search, Search Methods (Uninformed Search and Informed Search), Breadth First Search, Depth First Search, Difference between Breadth First Search and Depth First Search, Hill Climbing, Best First Search.	8
2	Role of Knowledge Representation in AI, Types of Knowledge, Properties of Knowledge Representation System, Categories of Knowledge Representation Scheme, First Order Predicate Calculus, Well Formed Formula in Predicate Logic, Conversion to Clausal Form, Resolution in Predicate Logic, Semantic Nets, Properties of Semantic Nets, Frames, Scripts, Advantages and Disadvantages of Scripts.	7
3	Introduction of Expert System, Comparison between Human Expert and Expert System, Comparison between Expert System and Software System, Difference between Knowledgebase and Database, Basic Components of an Expert System, Characteristics of Expert System, Life Cycle Development of Expert System, Advantages of Expert System, Limitation of Expert System, Expert System Tools, Existing Expert Systems (DENDRAL and MYCIN).	7

4	**Introduction to LISP:** Syntax and Numeric Functions, Working with GNU CLISP, Basic Data Objects in GNU CLISP, Basic List Manipulation Functions in GNU CLISP (setq, car, cdr, cons, list, append, last, member, reverse), User Defined Functions in GNU CLISP, Predicates (atom, equal, evenp, 69odell, oddp, zerop, >=, <=, listp, null) and Conditionals (cond and if) in GNU CLISP, Logical Functions (not, or, and) in GNU CLISP, Input / Output and Local Variables (read, print, princ, terpri, format, let, prog) in GNU CLISP, Recursion and Iteration(do) in GNU CLISP, Arrays in GNU CLISP	7
5	Introduction to PROLOG, Term, Ground Term, Function, Predicate, Features of PROLOG, Program Clause, Unit Clause, Logic Program, Goal Clause, Empty Clause, Simple Query, Conjunctive Query, Structure of PROLOG Program, Working with SWI-Prolog General Syntax of PROLOG, Execution of a Query in Logic Program (Ground Query and Non-Ground Query), Law of Universal modus pone, Ground Reduction, PROLOG Control Strategy, Search Tree and Proof Tree, Relational and Arithmetic Operators, Recursion in PROLOG, Lists manipulation in PROLOG, Iterative programming in PROLOG.	7

COURSE OUTCOMES: The students would have learnt

CO1: Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
CO2: Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
CO3: Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing
CO4: Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
CO5: Formulate and solve problems with uncertain information using Bayesia approaches.
CO6: Apply concept Natural Language processing to problems leading to understanding of cognitive computing

Text Books:

1. E. Rich and K. Knight, Artificial Intelligence, Forty Sixth Edition, Tata McGrawHill,2007.
2. D.W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Tenth Edition, Prentice Hall of India, 2001.

Reference Books:

1. S. Kaushik, Logic and Prolog Programming, New Age International Limited, 2006.

Sub Title: SOFTWARE TESTING AND QUALITY ASSURANCE		
Sub Code: CS206TPE08	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

- To discuss the fundamental concepts of Software Quality
- Finding defects which may get created by the programmer while developing the software.
- To make sure that the end result meets the business and user requirements.
- To gain the confidence of the customers by providing them a quality product.
- Gaining confidence in and providing information about the level of quality.

UNIT No	Syllabus Content	No of Hours
1	**Software Quality:** Ethical Basis for software Quality, Total quality Management Principles, Software Processes and Methodologies, Quality Standards, Practices & conventions	8
2	**Software Management:** Reviews and Audits. Enterprise Resource Planning Software, Measurement Theory, Software Quality Metrics, designing Software Measurement Programs, Organizational Learning.	7
3	**Improving Quality with Methodologies:** Structured information Engineering Object-Oriented Software, Reverse Engineering, Measuring Customer Satisfaction Defect Prevention, Reliability Models, Reliability Growth Models.	7
4	**Software Quality Engineering:** Defining Quality Requirements Management, Complexity Metrics and Models, Management issues for software Quality, Project Tracking and Oversight, Use of CASE tool Technology, Role of Groupware, data Quality Control.	7
5	**Project Configuration Management:** Configuration Management Concepts, Configuration Management Process, Document Control, Configuration Management plan of the WAR Project. **Software Testing:** Unit, Integration & System testing, Benchmarking and Certification.	7

COURSE OUTCOMES: The students would have learnt	
CO1.	Understanding basic concepts of software testing and quality assurance.
CO2.	Define the scope of software testing and quality assurance projects.
CO3.	Efficiently perform testing and quality assurance activities using modern software tools.
CO4.	Estimate cost of a testing and quality assurance project and manage budgets.
CO5.	Prepare test plans and schedules for a testing and quality assurance project.

Text Books:

1. Mark Paulik, The capability Maturity Model-guidelines for Improving the software Process, Addison Wesley
2. Wilson, Rodney C, Software RX secrets of Engineering Quality Software, Prentice Hall.

Reference Books:

1. Stephan Kan, Metrics and Models in Software quality, Addison Wesley.
2. Ginac, Frank P, Customer Oriented Software Quality Insurance, Prentice Hall

Sub Title: DESIGN AND ANALYSIS OF ALGORITHMS LAB	
Sub Code: CS206PPC07	No. of Credits: 1.5=0: 0: 1.5(L-T-P)
Exam Duration: 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

- Understand the recursive type algorithm with their data structure
- Understand the divide and conquer (with recursive function) and greedy algorithm like merge sort, quick sort and single source shortest path
- Understand the dynamic programming paradigm and analysis the single source and all pair shortest path algorithm
- Understand the branch and bound technique ,heap and Fibonacci data structure to implement optimization and sorting problem
- Analysis about some NP class problems

Unit No.	Syllabus Content	Teaching Hours
I, II, III, IV and V	• Simulate the Stack data structure (recursion) and do the posteriori analysis. • Simulate BFS, DFS on Graph and estimate the running time. • Simulate Prim's and Kruskal's Algorithm and do the posteriori analysis • Simulate Dijkstra's algorithm and do the posteriori analysis • Simulate all pair shortest path problem and do the posteriori analysis • Simulate Bellman algorithm and do the posteriori analysis • Simulate of Huffman Tree and do the posteriori analysis • Simulate of check whether a given graph is connected or not using DFS method and do the posteriori analysis • Simulate of Heap Tree and heap sort and do the posteriori analysis • Simulate of N Queen's problem using Back Tracking and do the posteriori analysis • Simulate 0/1 Knapsack problem using Dynamic Programming and do the posteriori analysis • Simulate TSP problem using Dynamic Programming and do the posteriori analysis • Simulate fractional Knapsack problem and do the posteriori analysis • Simulate to find a subset sum of a given set of integer number and do the posteriori analysis • Simulate to detect the circle in graph by using DFS algorithm and do the posteriori analysis	18

LAB OUTCOMES: The students would have learnt

CO1.	Implement recursive algorithm with array and stack data structure.
CO2.	Various tools to simulate divide & conquer algorithm and greedy using graph and link list.
CO3.	Dynamic programming to optimization type and decision type problems.
CO4.	Implement some problems like data compression algorithm and sorting algorithm using tree, array, etc.
CO5.	Simulate and optimize some NP class problem like SAT, Clique and TSP etc.

Text Books:

1. Introduction to Algorithm, Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, Clifford Stein, Publisher PHI, ISBN 81-203-2141-3
2. Algorithms, Sanjoy Dasgupta, Christos H. Papadimitriou and Umesh V. Vazirani, Tata McGraw- Hill, 2008.
3. Python Algorithms Mastering Basic Algorithms in the Python Language by Magnus LieHetland.
4. Algorithm Design, Jon Kleinberg and Éva Tardos, Pearson, 2005.

Reference Books:

1. Fundamentals of computer Algorithms, Horowitz, Sahani, Galgotia. 2nd Edition, 1998.ISBN 81- 7515-257-5
2. Data Structures and Algorithms Using Python Rance D. Necaise

Sub Title: JAVA LAB	
Sub Code: CS206PPC08	No. of Credits: 1.5=0: 0: 1.5(L-T-P)
Exam Duration: 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

- To provide the knowledge of Basics of Java.
- To learn the Concept of package and Applet in Java.
- To develop an awareness of modern programming language.
- Provide practical Knowledge and Skills for developing a program with java.
- Develop ability to design a small software using java.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Write a program to find a factorial of a given number. • Write a program to show all relational and Logical operator. • Write a program using Constructors • Write any program using the concept of method overloading. • Write a program to show the concept of Inheritance. • Write a program to using 10 string operations • Write a program using packages • Write a program to show the concept of Synchronization inMultithreading. • Write a program to show exception handling in java • Write a program to show human face using Applets	18

LAB OUTCOMES: The students would have learnt

CO1.	The basic concept of Java.
CO2.	Use an integrated development environment to write, compile, run & test simple object-oriented java program.
CO3.	About concept of Multithreading, Packages & Applet.
CO4.	Read and make elementary modifications to java programs that solve real world problems.
CO5.	To develop small software using java.

Text Books:

1. Programming with Java A Primer, E. Balagurusamy, Fourth Edition, McGrawHill, 2010.

Reference Books:

1. Java TM 2: The Complete Reference, H.Schildt, Fourth Edition, Tata McGrawHill, 2001.
2. A Programmer's Guide to Java TM SCJP Certification A Comprehensive Primer, K. A. Mughal and R. W. Rasmussen, Third Edition, Addison Wesley, 2008.

Sub Title: Industrial Utilities and Safety		
Sub Code: CH206TOE01	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:
To acquire the basic knowledge about various process utilities applied in industries and problemsrelated to hazard & safety.

UNIT No	Syllabus Content	No of Hours
1	Introduction: Role and types of process utilities in industries. Case studies of some major accidents occurred inprocess industries	8
2	Steam System: Generation and application in process plants. Introduction to design of efficient steam heatingsystems, Condensate utilization. Flash steam. Steam Traps: Types and characteristics.	7
3	Water, characteristics and conditioning for process industries e.g., steam piping, boiler feed, cooling etc.,Recycling of process water.	7
4	Introduction to process safety devices and general hygiene management. Storage and ventilation.	7
5	Fire and Explosion; Definition, flammability characteristics and explosion. Design to prevent fires and explosions by inverting, purging, ventilation, sprinkler systems. Static electricity controls, Relief valve in vapour/gas,Liquid and runway reaction services.	7

COURSE OUTCOMES: The students would have learnt
- CO1. Evaluate the requirement of process utilities in process industries,
- CO2. Calculate the steam requirement and its applications as utility.
- CO3. Explain fire and explosion and its prevention methods.

Suggested Text Books:
1. High Temperature heat carrier by A. V. Chechetekin, Pergammon Press.
2. Efficient use of Steam by P. M. Goodal, Guilford
3. Chemical Process Safety: Fundamental with applications by A. Crowl Daniel and F. L. Joseph, PHI Publications.

Reference Books;

1. Handbook of Heat Transfer media by P. I. Geiringer, Van Nostral Reinhold Inc. U.S.

Sub Title: Metro Systems and Engineering		
Sub Code: CE206TOE01	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

Course Learning Objectives:

1. To introduce concepts of different types of mode of transportation and associated facilities.
2. To understand the concept of urban transport scenario, traffic characteristics and transport development.
3. To study the Intelligence Transport System
4. To understand ITS user services and its components.
5. To understand the approach and utility of Environmental Impact Assessment for the urban infrastructural Measures.

UNIT No	Syllabus Content	No of Hours
1	Modes of Transportation: Transportation parameters- Traffic and Transport Problems of a city, Mass transport system, Modes of transportation & characteristics, public transport system, public private transport system, Advantages and disadvantages of public transport system. Role of transportation in mass transportation, advanced modes. Transportation Infrastructure- Green bays, control stations, mitigation buildings, separator lanes and safety islands.	8
2	Urban Public Transport System Rapid transit systems: BRTS, Bus Lane system, Advantages and limitations in Indian Scenario, Rail System. Types of rail system, advantages and disadvantages of rail system, sky walk and under bridge and its advantages. Advances in infrastructure. Urban Pedestrian Safety- Skyways, Intersection subways, halt stations, crossing measures, flexibility in accessibility.	7
3	ITS Background and Telemetric systems: Definitions, features and objectives of ITS, History of ITS and its development over the world, telemetric concept, transport telemetric, telemetric structure, ITS taxonomy, ITS application areas, uses, and application overview, ITS implication through AI, ITS based regression models.	7
4	ITS components, tools and strategies: Components of user services; advanced traffic management system, advanced traveler information systems, advanced vehicle control system, commercial vehicle operational management, advanced public transportation system, electronic payment system, advanced rural transportation, security and safety systems, urban traffic control, benefits and limitations, traffic calming systems, freight management by ITS.	7

5	Environmental Impact Assessment: Description of proposed activity, structural audits, analysis of site selection procedure, baseline conditions / major concerns, green building and its advantages, description of potential positive and negative environmental, social, economic and cultural impacts including cumulative, regional, temporal and spatial considerations, significance of mitigation plans and monitoring plans (impacts and mitigation efforts)	7

COURSE OUTCOMES: The students would have learnt

CO1.	To implement the concept of urban transport scenario, traffic characteristics and transport development.
CO2.	To adopt the concepts of different mode of transportation and associated facilities with advanced system.
CO3.	To Identify and differentiate ITS user services and its components.
CO4.	To plan and design appropriate ITS technology to solve real-life traffic problems.
CO5.	To propose the mitigation plan for the EIA for the urban infrastructure.

Text Books:

1. Kadialy L.R.," Traffic Engg. and Transport Planning", 8th edition, Khanna Publishers, 2011.
2. O. Flaherty C.A., "Traffic Engineering and Transport Planning", 2006.
3. AUSTROADS, The Implication of Intelligent Transport Systems for Road Safety, Austroads Incorporated, 1999.
4. Bob Williams, Intelligent Transport Systems Standards, Artech House Publishers, 2008.
5. Chowdhury, M. A. and Sadek, A, Fundamentals of Intelligent Transp. Sys. Planning, Artech House, 2003.
6. E. Bekiaris and Y.J. Nakanishi, Economic Impacts of Intelligent Transportation Systems: Innovations and Case

   Studies, Elsevier/JAI, 2004.
7. IET Intelligent Transport Systems and 15th International IEEE Conference on Intelligent Transportation Systems

   (ITSC), 16-19 September, 2012. (http://digital-library.theiet.org/content/journals/iet-its)
8. J.M. Sussman, Perspectives on Intelligent Transportation Systems (ITS), Springer, 2005
9. L. Vlacic, M. Parent, F. Harashima, Intelligent Vehicle Tech. – Theory and Appl., Butterworth-Heinemann, 2010.
10. M.A. Chowdhury and A. Sadek, Fundamentals of Intelligent Transport. Systems Planning, Artech House, 2010.
11. R. Stough, Intelligent Transport Systems: Cases and Policies, Edward Elgar, 2001, Artificial Intelligence and Intelligent Transportation Systems, National Academy Press, 2010.
12. Gonzalez R. C. and Woods R. C., "Digital Image Processing", 2nd Ed., Pearson Education, 2007.
13. Jain A. K, "Fundamentals of Digital Image Processing", Prentice Hall, 2007.
14. R.R. Barthwal "Environmental Impact Assessment" New Age International, January 2012.
15. A.R. Gajbhiye & S.R. Khandeshwar N.S. Raman, "Environmental Impact Assessment", I.K. International, 2014

Sub Title: Object Oriented Programming with C++		
Sub Code: CS206TOE01	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE

- To know different programming paradigms.
- To study and understand the object-oriented programming concepts and methodology.
- To implement object-oriented programming concepts in C++.
- To direct and handling file streaming
- To learn advance concept of Object-Oriented programming.

UNIT No	Syllabus Content	No of Hours
1	Principles of OOP: A look at procedure-oriented programming, OOP paradigm, Basic Concepts of OOPs, Benefits of OOP, object oriented Language. Beginning with C++ characters used in C++, Basic Data Types , C++ Tokens, Identifiers, Keywords, Constants, Variables, Input/Output statements, Structure of C++ program.	8
2	Operations and Expressions - Concept, Arithmetic Operations and Expressions, Relational and Logical operators and Expressions, Order of evaluation of expressions, Type conversion, Compound assignment Operator, Standard Library Functions and header files. Flow of control – Compound statement, sequential structure, selection structure, simple if, if-else nested if, ladder, switch, go to, loop structure, do-while, for, statement break, continue, function exit( )	7
3	Array and Function - Concept of array, Concept of subprogram, Parameter passing in function, Function prototype, Calling function, Call by value, Call by reference, Array parameters, Default argument, Returning values, Scope rules, Storage class, Inline function, Function overloading, Recursive functions. Structure, Class and Object - Define structure, Returning structure elements, Nested structure, Passing structure to function, User defined data type, Specifying a class, Defining member function, Scope of class and its member, Nested class, Data Hiding and encapsulation, Friend function, Object as function argument, Function returning object, Static member.	7
4	Constructors, Destructors, constructor function, parameterized multiple constructors, Default constructor, Copy constructor and Destructor function.	7

	Inheritance and aggregation - Derived class, various type of inheritance, Inheriting Constructors, Parts explosion as aggregation, Abstraction and property of aggregation, Constructing aggregations. Polymorphism, overloading and operator overloading.	
5	Pointer and virtual function - Pointer variable, dynamic allocationoperators, new and delete, this operator Pointers to derived class. Working with files - File & stream, Opening and closing a file, read() and write( ) functions, detecting end of file.	7

COURSE OUTCOMES: The students would have learnt

CO1. Programming environment and basic elements.
CO2. Introduction to object-oriented programming.
CO3. Key features of the object-oriented programming language.
CO4. Advantage concept of object-oriented concepts.
CO5. Streaming concepts for file handling.

REFERENCE BOOKS:

1. Object Oriented Programming With C++ by M. P. Bhave S. A. Patekar, Pearson Education
2. Object Oriented Programming with C++ by E. Balaguruswamy.
3. Object Oriented Programming in turbo C++ by Robert Lafore.
4. Programming with C++ by D. Ravichandan.
5. Programming with C++ (SOS) by Hubbard

Sub Title: Introduction to Electronic Devices & Circuits		
Sub Code: EC206TOE01	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

Course Objectives:

1. To develop basic concept of semiconductor materials and physics.
2. To develop an understanding of the PN junction diode and its behavior.
3. To introduce various types of special diodes and rectifier.
4. To develop the concept and analysis of transistor characteristics, Configuration and thermal stabilization.
5. To study the physics and construction of Field Effect transistors

UNIT No	Syllabus Content	No of Hours
1	**Semiconductor concept:** Atomic structure, Bohr's atom model, Energy Band Theory of Crystals, Energy Band Structures in Metals, Semiconductors and Insulators, forbidden energy gap, Electrical properties of Ge and Si, Conductivity Equation, Mobility and Conductivity, Electron and holes in intrinsic and extrinsic semiconductors, P type and N type semiconductors– majority and minority carriers, Mass action Law, Hall effect, Carrier generation and recombination, Carrier transport: diffusion and drift process, Variation of semiconductor conductivity, resistance and bandgap with temperature and doping.	8
2	**PN Junction Diode:** Properties of P-N Junction, Open Circuited P-N Junction, Behaviour of P-N junction under forward and reverse bias, Current component of PN Diode, VI Characteristics, Temperature dependence of V-I Characteristics, Ideal diode, Breakdown phenomenon: Zener and avalanche breakdown, Diode resistance: Static and dynamic resistance, Diode Capacitance: Transition and Diffusion Capacitance, Switching Characteristics.	7
3	**Special Purpose Diodes:** Zener Diode, Varactor Diode, Tunnel Diode, Photodiode, Light Emitting Diodes- Construction, working and characteristics, Applications of Diodes: Half-Wave Diode Rectifier, Full-Wave Rectifier, Clippers and Clampers.	7
4	**Transistors:** Definition, formation of transistor- PNP and NPN, symbols, working principle, Regions of operation, Transistor current components, Transistor construction, Common Base, Common Emitter & Common Collector configurations and their characteristics, Early Effect, Current Gains: α, β, and γ relation between them, simple problems, comparison of CB, CE and CC modes, Transistor as a switch, Transistor as an amplifier, Thermal runaway, Thermal stability.	7

5	**Field Effect Transistor:** JFET Construction, Operation, VI characteristics, Transfer characteristics, Drain characteristics. FET as voltage variable resistor, Metal Oxide Semiconductor Field Effect Transistor (MOSFET): construction and working of enhancement and depletion modes, Drain and transfer characteristics, Application of MOSFET as a switch, Comparison of JFET & MOSFET.	7

Course Outcome:

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

1. Analyze the operation of semiconductor physics.
2. Describe the working principle and characteristics of PN diode.
3. Describe the principle of operation and characteristics of special Semiconductor diodes.
4. Analyze the Bipolar Junction Transistor characteristics and configurations.
5. Analyze the Field Effect Transistor characteristics and its applications.

Text/Reference Books:

1. Integrated Electronics: Analog & Digital Circuit Systems- Jacob Millman & Halkias, TMH
2. Electronic Devices & Circuits- Allen Mottershead, PHI
3. Electronic Devices & Circuit Theory- Boylestad & Nashelsky, PHI
4. G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices," 7th edition, Pearson,2014
5. D. Neamen, D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education
6. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley &Sons, 2006.
7. Sanjeev Gupta, "Electronic Devices and Circuits", Dhanpat Rai Publications.

Sub Title: Computer Graphics		
Sub Code: IT206TOE01	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

Course Objectives:

1. The main objective of the course is to introduce students with fundamentalconcepts and theory of computer graphics.
2. Understand the need of developing graphics application.
3. Learn algorithmic development of graphics primitives like: line, circle, polygonetc.
4. Learn the representation and transformation of graphical images and pictures.
5. It presents the important drawing algorithm, polygon fitting, clipping and 2D transformation curves and an introduction to 3D transformation.

UNIT No	Syllabus Content	No of Hours
1	**OVERVIEW OF GRAPHICS SYSTEM:** I/O devices, Raster scan & Random scan system, DDA & Bresenhams Line drawing Algorithm, Mid-Point & Bresenhams circle drawing Algorithm, Mid-point ellipse generating algorithm, Clipping: Sutherland Cohen Line Clipping, Polygon clipping: Hodgeman- Sutherland & Weiler-Atherton polygon clipping, 2-D & 3-D Transformation.	8
2	**CURVES &SURFACES:** Conics-Parametric forms for circle, ellipse, parabola, Bezier Curves-Need for cubic parametric curves c0, c1, c2 continuity, Generation though Bernstein polynomials, Condition for smooth joining of 2 segments, Convex Hull property, B-Spline Curves: Knot vectors-uniform and open uniform curves, Uniform, Periodic B-splines, Open B-splines, Uniform B-splines, Non-uniform B-splines, Rational B-splines, Beta splines.	7
3	**PROJECTIONS & HIDDEN SURFACE REMOVAL:** Parallel projection on x-y plane (including oblique view), Perspective projection-1, 2 and 3 Vanishing points, Reconstruction of 3-D images. Hidden Surface Removal: Back face removal, Floating Horizon method for curved objects, Z-Buffer or Depth Buffer Algorithm, Painter's algorithm (Depth sorting method), Binary space partitioning trees, Scan-line algorithm, Warnock's algorithm.	7
4	**SHADING & COLOR ISSUES:** Filled Area Primitives, Illumination model for diffused & specular reflection, Computing reflection vector, Gouraud and Phog Shading, Texture mapping, Bump mapping, Handling shadows, Radiosity: Lambert's Law, Basic element, Modeling transparency, Visualization of data sets, volume rendering, Color issues: Additive, Subtractive primaries, Filled Area Primitives.	7

5	**FRACTALS & ANIMATION:** Fractals: self-similar fractals-fractal dimension, Generation of Terrain-random midpoint displacement, Self-squaring fractals. Solid Modeling: Generation through sweep techniques, Constructive sold geometry, B representations, Octrees, Ray Tracing & their Theory, Animation: In-between using rotation and translation, Procedural animation, Morphing, Motion Control (Key framing).	7

COURSE OUTCOMES: The students would have learnt

CO1.	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO2.	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
CO3.	Use of geometric transformations on graphics objects and their application in composite form.
CO4.	Extract scene with different clipping methods and its transformation to graphics display device.
CO5.	Explore projections and visible surface detection techniques for display of 3D sceneon 2D device.

Text Books:

1. Computer graphics, Hearn and Baker, PHI.

Reference Books:

1. Procedural elements of Computer Graphics, Rogers, McGraw Hill
2. Computer graphics, Harringtons S., McGraw Hill
3. Computer graphics, Schoum Series

Sub Title: Automobile Engineering		
Sub Code: ME206TOE01	No. of Credits: 3=3: 0: 0(L-T-P)	No of lecture hours/week:03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours:36

Course Objective:

- To understand the basic structure of an automobile.
- To provide the concept of various subsystem associated with automobiles.
- To get an idea of different types of loads, resistances & safety features present in automobiles.
- To understand the functions of individual components associated with vehicles.
- To get knowledge on modern technology implemented in vehicles

UNIT No	Syllabus Content	No of Hours
1	Introduction: Introduction of an automobile, component & basic structure of automobile, classification, types of chassis layout with reference to prime mover location &drives. Vehicle frames: various types of frames, constructional details, materials, testing of vehicle frames, defects in frames, frameless construction & specifications, loads acting on the vehicle frame, chassis lubrication & calculation of stresses on sections. Front axle & steering system: Types of front axles, construction details, materials. Front wheel geometry viz. castor, camber, king pin inclination, Toe-in. Condition for true rolling motion of wheels during steering. Steering geometry, Ackerman & Davis steering system. Constructional details of steering linkages, different types of steering gears. Power & power assisted steering.	8
2	Transmission system: Function of transmission system, types: Sliding mesh, constant mesh & synchromesh gear box. Torque converter: Principle of operation, construction, performance characteristics, multiphase & polyphaser torque converter. Automatic transmission: Epi-cyclic gear box, determination of gear ratios for the vehicles. Clutches. Hydrostatic drive system: Types, principles, advantage & limitation, construction & working. Electric drive: Principle of early & modified Ward Leonard control system, advantages &limitations. Continually Variable Transmission (CVT): Operating principle, basic layout & operation, advantages & disadvantages. Braking system: Necessity of brake, stopping distance & time, brake efficiency, weight transfer, brake shoe, determination of braking torque. Braking systems: Mechanical, hydraulic, disc, drum, parking & emergency brakes. Power, servo & electrical brakes. Details of hydraulic system, mechanical system & components, master cylinder, factors influencing the operation of brakes such as: operating temperature, lining, brake clearance, pedal pressure, linkages etc. Different types of retarders: Eddy current & hydraulic retarders. Antilock braking system.	7

3	Driveline: Effect of driving thrust & torque reactions. Hotchkiss drive & torque tube drive, Propeller shaft, Universal joint, Constant velocity universal joint. Front wheel drive. Final drive & differential: Different types of final drive: Worm & worm wheel, straight bevel gear, spiral bevel gear hypoid gear final drives. Differential principles. Constructional details of differential unit. Non-slip differential.	7
4	Suspension & safety system: Need of suspension system, types of front & rear instructional details & characteristics of leaf spring, coil spring & torsion bar. Telescopic type shock absorbers, pneumatic suspension system, air bags, crash resistance & passenger comfort. Rear construction: Construction of rear axles, 4 types of rear axles: full floating, three quarter floating & semi floating rear axles. Rear axle housing. Construction of different types of axle housing. Multi-axle vehicles, constructional details of multiaxle vehicles	7
5	Wheels & tires: Types of wheels, construction, weird wheels, tires, construction, types: radial, bias & belted bias, slip angle, under & oversteering, tread patterns, tire specification, tubeless tire. Modern vehicle technology: Fuel cells technology for vehicles: what is fuel cell? type of fuel cell, advantages, current state of the technology, potential & challenges. Stratified charged/learn burn engines-hydrogen engines, advantages & disadvantages of hydrogen fuel. Electrical & hybrid vehicles, magnetic track vehicle. Latest engine technology features: DTS-I, GDI, Variable valve timing, electromagnetic valves.	7

Course Outcomes: The students would have learnt

- Graduates will against wrong foundation in core automobile engineering, both in theoretical & applied concepts.
- Acquire knowledge and hands-on competence in the design & development of an automobile.
- Graduates will be able to demonstrate & get an idea in identifying the problems in automobile.

Suggested Texts and Reference Materials

1. Automobile Engineering, K. K. Ramalingam, Sci tech Publications Pvt Ltd.
2. Automobile Technology, Dr. N. K. Giri, Khanna Publishers.
3. Automobile Engineering, Prof. Amitosh De, Galgotia Publications Pvt Ltd.
4. Modern Transmission Systems, A. W. Judge, Chapman & Hall Ltd.
5. Automotive Mechanics-Principle & Practice, Josepe Heitner, East West Press.
6. Torque Converter, P.M. Heldt, Chilton Book Co.

Sub Title: TCP/IP INTERNETWORKING		
Sub Code: CS207TPE09	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

Analyse and differentiate networking protocols used in TCP/IP protocol suite.
Implement the concepts of naming and addressing to IPv4 and their extension to IPv6.
Categorize problems such as reliable transport, data delay, congestion and flow control and describe congestion control schemes used in TCP.
Discuss the Internet best-effort type of service and its improvements.
Discuss the functionality of ATM network and ISDN.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Introduction to internetworking, Overview of OSI Model TCP/IP protocol suite, Basics of switching technologies and switches, Comparisons of different models. Gateways.	8
2	**Internet Protocol:** Purpose of Internet Protocol, Internet datagram, Options, Checksum, ARP and RARP Routing Methods: Routing Table, ICMP, IGMP. **IP Addresses:** Introduction, Address Classification, A sample internet with classful addressing, Subnetting, Supernetting, Classless addressing, Security at the IP Layer, IPSec, IPv4 and IPv6 packet formats.	7
3	**Routing Protocols:** Unicast Routing Protocols: Interior and Exterior routing, RIP, OSPF, BGP, **Multicasting:** Introduction, Multicast Routing, Multicast Routing Protocols, Multicast Trees, DVMRP, MOSPF, CBT,PIM, MBONE.	7
4	**Transmission Control Protocol:** **TCP:**TCP operation, Segment, Sliding window, Silly window, Options, TCP state machine, Karn's Algorithm, Congestion control- Leaky bucket and Token bucket algorithms. **UDP:** User Datagram, UDP operations, Checksum calculation.	7

5	**TCP/IP Over ATM Networks:** ATM reference model, ATM Switch, Interconnection Network, Virtual circuit in ATM, Paths, Circuits and identifiers, ATM cell transport and adaptation layers, packet type and multiplexing, IP Address binding in an ATM Network, Logical Subnet Concept and Connection Management. ISDN and B-ISDN.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the functions of each layer of TCP/IP model. CO2: Understand the functions of different Protocols.
CO3: Understand the congestion control provided by the protocols.
CO4: Understand the Quality of Services mechanism provided by protocol. CO5: Understand the concept of ATM and ISDN Network.

Text Books:

1. Internetworking with TCP/IP by Comer, Vol. 1, PHI Pub.
2. TCP/IP Protocol suite by Behrouz A. Forouzan.,TMH

Pub. Reference Books:

1. Computer Networking by James F. Kurose, Keith W. Ross, Pearson Education
2. TCP/IP Illustrated By Wright and Stevens, Vol.2, Pearson Education
3. An Introduction to Computer Networks by Kenneth C. Mansfield Jr. James L.

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: WEB TECHNOLOGY		
Sub Code: CS207TPE10	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

Become familiar with graphic design principles that relate to web design and learn.
How to implement theories into practice.
Develop skills in analyzing the usability of a web site.
Understand how to plan and conduct user research related to web usability.
Learn the language of the web: HTML and CSS.
To work on VB-Script, Java Script, XML, PHP etc.

UNIT No	Syllabus Content	No of Hours
1	Fundamentals of web, History of the web, Growth of the web in post decade, Web function, Security aspects on the web, Computational features encompassing the web, working web. Browsers, concepts of search Engines, Searching the web, web Servers.	8
2	**Internet:** Networks, Client & Server, WWW, URL, HTTP, Internet requirements, Internet Services, Internet Java Script introduction, operators, statements, loops, object manipulation, function, object, events handler, always, events.	7
3	**HTML:** Introduction, cascading style sheets, content positioning HTML content, Downloadable fonts, using Java script with positioned content, Layer object, Handling events using localized scripts, Animating images, VB script, Introduction, Adding VB script to web Range, working with variables, constants, arrays, objects, conditional statements loop statements, Forms.	7
4	**Active Server Page (ASP):** Introduction , Internet Information System , A authentication, Basic authentication , NT challenge response, active server page, asp objects , server objects, file system objects, session, accessing database with an ASP page, create an ODBC ADO connection object, common methods & Properties events, collection ADO record set object.	7
5	**XML** : Introduction, To XML, XML schemas, DOM structure model, using XML queries, Building a path, sharing functions. Introduction of personal home page (PHP) design.	7

COURSE OUTCOMES: The students would have learnt

CO1: Have a Good grounding of Web Application Terminologies.
CO2: Improvement the knowledge about the web security in Internet Tools, CO3: Web designing use in E– Commerce and other web services.
CO4: Get introduced in the area of Online Game programming.
CO5: Expertise in the web pages designing for software companies. CO6: Easy in software development etc.

Text Books:

1. Web Technology, Achyut S Goklbole and Atul Khute, Tata McGraw Hill.
2. Web Technology: A Developer's perspective, Gopalan NO Akilandeswari, PHP.

Reference Books:

1. Web Technology & Design, C Xavier, Tata Mc Grarw Hill.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO 3
CO 1	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 2	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 4	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 5	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 6	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3

Weightege: 1-Slightly; 2-Moderately: 3-Strongly;

Sub Title: DATAMINING		
Sub Code: CS207TPE11	No. of Credits : =3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

To introduce the concept of data Mining as an important tool for enterprise data management and as a cutting edge technology for building competitive advantage.

To enable students to effectively identify sources of data and process it for data mining

To make students well versed in all data mining algorithms, methods of evaluation.

To impart knowledge of tools used for data mining

To provide knowledge on how to gather and analyze large sets of data to gain useful business understanding.

Get in-depth hands-on experience in designing and developing a real operational system

UNIT No	Syllabus Content	No of Hours
1	**Data Ware Housing:** Introduction, Multidimensional data model, OLAP Operation, Warehouse schema, Data Ware Housing Architecture, Warehouse Server, Metadata, OLAP, engine. **Data Mining:** Introduction, KDD Vs Data mining, DBMS Vs DM , DM Techniques , Other mining problem, Issues & Challenges in DM,DM Application Areas.	8
2	**Association Rules:** Introduction, Methods to discover association rules, A Priori Algorithm ,Partition Algorithm, Pincer –Search algorithm , Dynamic Item set counting algorithm , FP-tree Growth algorithm , Incremental algorithm, Border algorithm.	7
3	**Clustering Techniques:** Introduction, Clustering paradigms, Partitioning algorithms, k-Medoid Algorithm, CLARA ,CLARANS , Hierarchical clustering , DBSCAN , BIRCH, CURE, Categorical clustering algorithms , STIRR, ROCK , CACTUS.	7
4	**Decision Trees:** Introduction, Tree construction principal, Best spilt splitting indices, Splitting criteria, Decision tree construction algorithm, CART, ID3,C4.5 , CHAID , Decision tree construction with presorting , Rainforest , CLOUDS, BOAT.	7
5	**Web Mining:** Web mining, Web content mining, Web structure mining, Web usage mining, Text mining, Episode rule discovery for texts, Hierarchy of categories, Text clustering.	7

COURSE OUTCOMES: The students would have learnt

CO1: Demonstrate an understanding of the importance of data mining and the principles of business intelligence
CO2: Organize and Prepare the data needed for data mining using pre preprocessing techniques CO3: Perform exploratory analysis of the data to be used for mining.
CO4: Implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets.
CO5: Define and apply metrics to measure the performance of various data mining algorithms.

Text Books:

1. Data Mining techniques, Arun K Pujari Universities press
2. Data Mining concepts & techniques, Jiawei han , Micheline kamber Morgan Kaufmann publisher Elsevier India

Reference Books:

1. Data Mining methods for knowledge Discovery, Cios , Pedrycz , swiniarski Kluwer academic publishers London

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: CYBER CRIME AND SECURITY		
Sub Code: CS207TPE12	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

The learner will understand key terms and concepts in cyber law, intellectual property and cyber crimes, trademarks and domain theft.

The learner will be able to examine secure software development practices.

The learner will understand principles of web security.

The learner will be able to incorporate approaches for incident analysis and response

UNIT No	Syllabus Content	No of Hours
1	Introduction to Cyber Law Evolution of Computer Technology, emergence of Cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.	8
2	Information technology Act Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature, Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.	7
3	Cyber law and related Legislation Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Sections of Indian Penal Code, Relevant Sections of Reserve Bank of India Act, Law Relating To Employees And Internet, Alternative Dispute Resolution , Online Dispute Resolution (ODR).	7
4	Electronic Business and legal issues: Evolution and development in E-commerce, paper vs paperless contracts E-Commerce models- B2B, B2C,E security.	7

5	Application area : business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the nature and scope of cybercrime.
CO2: Develop knowledge of major incidents of cybercrime and their resulting impact. CO3: Analyze and discuss national and global digital law enforcement efforts.
CO4: Critically consider specific laws and policies governing cybercrime detection
CO5: Identify and evaluate the specific technology that facilitates cybercrime and

Text Books:

1. Cyber Laws: Intellectual property & E Commerce, Security- Kumar K, dominant Publisher
2. Information Security policy &implementation Issues, NIIT, PHI
3. Cyber Crime notorious Aspects of the Humans & net Criminals activity in Cyber World Barna Y Dayal D P Dominant Publisher

Reference Books:

1. Cyber Crime Impact in the new millennium, Marine R.C. Auther press
2. Spam Attack, Cyber Stalking & abuse, Barna Y, Dayal D P Dominant publisher
3. Frauds & Financial criouses in Cyber space, Barna Y, Dayal D P , Dominant publisher

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: COMPILER DESIGN		
Sub Code: CS207TPC14	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

Learn Basic Concept of compiler design.
To Discuss Six phases of compiler.
To Learn Basic functions of All Phases of Compiler.
To Learn Functions of Symbol Table and Error Handler
Develop ability to analyze a compiler.

UNIT No	Syllabus Content	No of Hours
1	Overview of translation process. , Definition, Phases of Compiler, Lexical analysis: Introduction, Functions of lexical Analysis, automatic generation of lexical analyzers	8
2	**Parsing Theory**: Introduction, Difference between Top Down and bottom up parser. Different Types of Parsers : Predictive Parser, Shift-Reduce Parser, LR Parsers(SLR, CLR, LALR), Operator Precedence Parser Automatic generation of parsers.	7
3	**Intermediate Code Generation:** Different intermediate forms: Syntax tree , TAC , Quadruples, Triples, . Indirect Triples, Syntax directed translation mechanism and attributed definition. **Code Optimization:** Global data flow analyses, A few selected optimizations like command sub expression removal, loop invariant code motion, strength reduction etc.	7
4	**Code Generation:** DAG, Machine model, order of evaluation, registers allocation and code selection, Code generation algorithm.	7
5	**Run Time Theory Management:** static memory allocation and stack based memory allocation schemes. Symbol table management.	7

COURSE OUTCOMES: The students would have learnt

CO1: Fundamentals of Compiler Design.
CO2: Translation Mechanism from Input to Output in Compiler. CO3: To know about compiler generation tools and techniques CO4: To understand the importance of All phases of Compiler CO5: To Analyze a compiler for a simple programming language

Text Books:

1. Gulshan Goyal, Compiler Design , sun India publication.
2. Anamika Jain, compiler Design.

Reference Books:

1. A.V.Aho, Ravi Sethi, J.D.Ullman, Compilers tools and Techniques, Addison Wesley, 1987.
2. Waite W.N. and Goos G., Compiler construction' springer verlag, 1983.
3. Tremblay J.P. and Sorenson, P.G. the theory and practice of compiler writing, Mc Graw Hil, 1984.

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: COMPILER DESIGN LAB	
Sub Code: CS207PPC09	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

The understanding of compiler design.
To learn different phases of compiler and how to implement them.
To develop an awareness of the function and complexity of modern compilers.
Provide practical Knowledge and Skills for developing a compiler.
Develop ability to design and analyze a compiler.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Write a C/C++ program to implement the design of a Lexical analyzer to recognize the tokens defined by the given grammar. • Write a program to find string is identifier or not. • Write a program for NFA. • Write a program to find all terminal s and non terminal in a given grammer. • Write a program to find the FIRST of all Non Terminal of Given Grammer. • Write a program to find the FOLLOW of all Non Terminal of Given Grammer. • Write a C program to implement Type Checking • Write a Program to implement intermediate Code. • Write a program to optimize an Intermediate code Using Dead Code Elimination • Write a program to optimize an Intermediate code Using Common Sub Expression Elimination	18

LAB OUTCOMES: The students would have learnt

CO1: Understanding of basic Concept of Compiler Design.
CO2: Students will understand the practical approach of Working of compiler. CO3: To know about compiler generation tools and techniques
CO4: To understand the importance of code optimization
CO5: Design a compiler for a simple programming language

Text Books:

1. Compiler Design, Gulshan Goyal, Sun India publication.
2. Compiler Design, Anamika

Jain Reference Books:

1. Object Oriented Programming with C++ by M P Bhave S,A. Patekar, Pearson Education
2. Compilers tools and Techniques, A.V.Aho, Ravi Sethi, J.D.Ullman, Addison Wesley, 1987.
3. Compiler construction, Waite W.N. and Goos G., springer verlag, 1983.
4. P.G. the theory and practice of compiler writing, Tremblay J.P. and Sorenson, Mc Graw Hil, 1984.

Course Outcomes and their mapping with Programme Outcomes:

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

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Sub Title: MACHINE LEARNING		
Sub Code: IT207TOE01	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To expose the applications of machine learning.
2. To study the various algorithms related to supervised and unsupervised learning.
3. To recognize the different types of machine learning models and how to use them.
4. To learn the theoretical and practical aspects of probabilistic graphical models.
5. To acquire the knowledge of various classification techniques.
6. To learn the various neural network algorithms.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Machine Learning:** Introduction - examples of machine learning applications - Types of machine learning- Mathematical foundations of machine learning– Introduction to Parametric Models – Non-Parametric Models –Probability Basics	8
2	**Supervised Learning:** Linear Models for Regression – Linear Basis Function Models - The Bias-Variance Decomposition - Bayesian Linear Regression - Bayesian Model Comparison, Limitations of Fixed Basis Functions - Linear Models for Classification, Discriminant Functions -Probabilistic Generative Models –Probabilistic Discriminative Models - Bayesian Logistic Regression. Neural Networks – Network Training - Feed-forward Network Functions, Back Propagation Network, Bayesian Neural Network	7
3	**Unsupervised Learning:** Clustering- K-means - EM Algorithm- Mixtures of Gaussians Dimensionality Reduction - Factor analysis - Principal Component Analysis Probabilistic PCA -Independent components analysis - Singular Value Decomposition.	7
4	**Probabilistic Graphical Model:** Graphical Models - Undirected graphical models - Markov Random Fields-Directed Graphical Models -Bayesian Networks - Conditional independence properties - Inference – Learning - Generalization - Hidden Markov Models -Conditional random fields	7
5	**Genetic Algorithms:** an illustrative example, Hypothesis space search, Genetic Programming, Models of Evolution and Learning; Learning first order rules-sequential covering algorithms-General to specific beam search-FOIL; REINFORCEMENT LEARNING – The Learning Task, Q Learning.	7

COURSE OUTCOMES: The students would have learnt

CO1: Describe the concepts and models of machine learning.
CO2: Design and implement algorithms for supervised and unsupervised learning.
CO3: Develop skills of using recent machine learning software for solving practical problems.
CO4: Analyze the efficient clustering techniques for solving real world problems.
CO5: Implement probabilistic discriminative and generative algorithms for an application and analyze the results.

Text Books:

1. Machine Learning: A Probabilistic Perspective, Kevin Murphy, MIT Press, 20122.
2. Pattern Recognition and Machine Learning, Christopher Bishop. 2e
3. Machine Learning, Tom M. Mitchell, McGraw-Hill Education (India) Private Limited, 2013

Reference Books:

1. Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 1st edition, ISBN-13: 978-0387-31073-2, 2006.
2. Introduction to Machine Learning, Ethem Alpaydin, 3rd Edition, MIT Press, ISBN:9780262028189, 2014.
3. Machine Learning: a Probabilistic Perspective, Kevin Patrick Murphy, 4th edition, MIT Press,ISBN:9780262018029, 2013.
4. Machine Learning for Hackers, Drew Conway, John Myles White, 1st Edition, O'ReillyMedia, 2012.
5. Data Mining: Practical Machine Learning Tools and Techniques, Ian H. Witten, Eibe Frank,Mark A. Hall, 3rd Edition, Morgan Kaufmann, 2011.

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
CS207TOE01	3	0	0	3 HOURS	30	70	3

GIS & Remote Sensing

Objective:

1. Understand the basic concept of Remote Sensing and know about different types of satellite and sensors.
2. Illustrate Energy interactions with atmosphere and with earth surface features, Interpretation of satellite and top sheet maps.
3. Understand different components of GIS and Learning about map projection and coordinate system.
4. Develop knowledge on conversion of data from analogue to digital and working with GIS software.

Unit 1: Overview of Information System, GIS Definitions and Terminology , Spatial Data Modeling, Stages of GIS Data Modeling, Graphic Representation of Spatial Data , Raster GIS Models , Vector GIS Models, GIS Data Management, GIS Data File Management , Database Models , Storage of GIS Data, Object Based Data Models

Unit2: GIS Types and Available GIS Software, remote sensing: remote sensing, platforms, sensors, resolution, satellites, multispectral, thermal, hyper spectral and Microwave sensing, GPS and its various terminology.

Unit3: Digital Image Processing: Preprocessing , Image Registration, Image Enhancement Techniques, Spatial Filtering Techniques, Image Transformations, Image Classification,

Unit4 : Working with oracle spatial, Overview of Oracle Spatial, Basic Spatial, Loading, Transporting, and Validating Spatial Data,

Unit5: Oracle Spatial and Network Analysis, Visualization, Spatial in Applications.

TEXT BOOKS:

1. Remote sensing and GIS paperback by Basudeb Bhatta oxford university press.
2. Introduction to Geographic Information Technology, Sujit Choudhary, Deepankar Chakrabarti & Suchandra Choudhary.
3. Pro Oracle Spatial for Oracle Database 11g, Ravikant Kothuri.

REFERENCE BOOKS:

1. ArcPy and ArcGIS – Geopatial Analysis with Python, Packet Publishing Limited, Toms Silas.
2. Developing Mobile Web ArcGIS Applications, Sheehan Matthew.
3. Spatial Analysis, GIS and Remote Sensing, Gesler Albert.
4. Learning ArcGIS for Desktop, Docan Daniela Cristiana Applying and Extending Oracle Spatial, Greener Simon.

Outcome:

On completion of the course, the student should be able to:

1. Explain the basics of geographic information systems (GIS) and related areas such as geodesy and remote sensing.
2. Select and acquire both primary and secondary spatial data for use in GIS.
3. Manage, and analyze digital data in raster and vector formats.
4. Describe how common analytical methods and techniques work.
5. Create and present a GIS project.

Sub Title: NETWORK SECURITY		
Sub Code: CS208TPE13	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

The concepts of classical encryption techniques and concepts of finite fields and number theory.

And explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms

And explore the design issues and working principles of various authentication protocols, PKI standards.

And explore various secure communication standards including Kerberos, IPsec, and SSL/TLS and email.

The ability to use existing cryptographic utilities to build programs for secure communication.

UNIT No	Syllabus Content	No of Hours
1	Services , Mechanisms ,and Attacks , The OSI Security Architecture , A Model for Network Security , symmetric cipher model , substitution techniques Transposition techniques, Steganography.	8
2	Block ciphers and the data encryption standard, Simplified DES, Block cipher principles , The data Encryption Standard ,The Strength of DES. Differential and Linear Cryptanalysis ,Block Cipher Design principles ,Block Cipher Modes of Operation , Evaluation Criteria for AES The AES cipher , Triple DES , blowfish , RC5, Rc4 Stream Cipher	7
3	**Principles of public:** Key Cryptosystems , Public –Key cryptosystems , Applications for public –Key Cryptosystems , Requirements for public –Key Cryptosystems , Public –Key Cryptosystems , The RSA Algorithm , Computational Aspects , The Security of RSA , Key management , Distribution of public keys , Public –Key Distribution of Secret Keys , Differ –Hellmann Key Exchange.	7
4	**Web Security:** Web Security Threats , Web Traffic Security Approaches , SSL Architecture , SSL Record Protocol , Change Cipher Spec Protocol ,Alert Protocol , Handshake Protocol , Cryptographic Computations ,Transport Layer Security , Secure Electronic Transaction.	7

5	**Intruders:** Intrusion Techniques ,Intrusion Detection , Audit Records , Statistical Anomaly Detection ,Rule –Based Intrusion Detection ,The Base – Rate Fallacy , Distributed Intrusion Detection , Honeypots , Intrusion Detection Exchange Format Firewall Design principles , Firewall Characteristics , Types of Firewalls , Firewall Configurations.	7

COURSE OUTCOMES: The students would have learnt

CO1: Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory.

CO2: Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication.

CO3: Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes

CO4: Apply different digital signature algorithms to achieve authentication and create secure applications

Text Books:

1. Cryptography And Network Security, Principles And Practice Sixth Edition, William Stallings, Pearson
2. Information Security Principles and Practice By Mark Stamp, Willy India Edition
3. Cryptography & Network Security, Forouzan, Mukhopadhyay, McGrawHill

Reference Books:

1. Cryptography and Network Security Atul Kahate, TMH
2. Cryptography and Security, C K Shyamala, N Harini, T R Padmanabhan, Wiley-India
3. Information Systems Security, Godbole, Wiley-India
4. Information Security Principles and Practice, Deven Shah, Wiley-India
5. Security in Computing by Pfleeger and Pfleeger, PHI
6. Build Your Own Security Lab : A Field Guide for network testing, Michael Gregg, Wiley India

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO2	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO3	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO4	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO5	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO6	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: MOBILE APPLICATION DEVELOPMENT		
Sub Code: CS208TPE14	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

To facilitate students to understand android SDK
To help students to gain a basic understanding of Android application development
To inculcate working knowledge of Android Studio development tool

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Android:** The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android, Manifest file.	8
2	**Android Application Design Essentials:** Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.	7
3	**Android User Interface Design Essentials:** User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.	7
4	**Android Applications:** Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.	7
5	**Using Common Android APIs:** Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World..	7

COURSE OUTCOMES: The students would have learnt

CO1: Identify various concepts of mobile programming that make it unique from programming for other platforms.
CO2: Critique mobile applications on their design pros and cons.
CO3: Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
CO4: Program mobile applications for the Android operating system that use basic and advanced phone features.
CO5: Deploy applications to the Android marketplace for distribution.

Text Books:

1. Android Wireless Application Development, Lauren Darcey and Shane Conder, Pearson Education, 2nd ed. (2011)

Reference Books:

1. Professional Android 2 Application Development, Reto Meier, Wiley India Pvt Ltd
2. Beginning Android, Mark L Murphy, Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies, Barry Burd, 1st Edition.

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: CLOUD COMPUTING		
Sub Code: CS208TPE15	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

Basics of cloud computing.
Key concepts of virtualization.
Different Cloud Computing services
Cloud Implementation, Programming and Mobile cloud computing
Cloud Backup and solutions

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Introduction to Cloud Computing, Evolution of Cloud, Cloud Computing Characteristics, Benefits and Challenges of Cloud Computing, Emergence of Cloud Computing, Cloud Based Service Offerings, Cloud Computing Application.	8
2	**Cloud Models:** Introduction to Cloud Models, Cloud Models: Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud.	7
3	**Standard & Security:** Introduction to Cloud Standards, Cloud Security Challenges, Cloud Data Security, Network Security, Host Security, Database Management.	7
4	**Cloud Services:** Introduction to Service, Infrastructure as a Service (IAAS), Platform as a Service (PAAS), Software as a Service (SAAS), Storage as a Service (StaaS), Database as a Service (DaaS), Process as a Service (PraaS), Security as a Service (SecaaS), Different Security issues of Cloud Computing.	7
5	**Virtualization:** Introduction, Virtualization Architecture, Types of Virtualization, Pros and Cons of Virtualization, Virtual Machine, Types of Virtual Machine.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the concept of Cloud Computing and Cloud service and deployment models
CO2: Apply and design suitable Virtualization concept, Cloud Resource Management and design
scheduling algorithms.
CO3: Use and Examine different cloud computing services
CO4: Understand cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application
CO5: Analyze authentication, confidentiality and privacy issues in cloud computing

Text Books:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya,James Broberg, Andrzej M.Goscinski, Wiley.
2. Cloud Computing by M. N. Rao, PHI.
3. Cloud Computing: A Practical Approach by Toby Velte, Anthony Vote and Robert Elsenpeter,McGraw Hill.

Reference Books:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley India Edition.
2. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz,Russell Dean Vines, Wiley- India,2010

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: 1-Slightly; 2-Moderately: 3-Strongly;

Sub Title: BIG DATA ANALYSIS		
Sub Code: CS208TPE16	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

To formulate the difference between Big data and Data Analytics.
To provide the students with the conceptual knowledge of Big Data.
To get familiarized with the analytical methods.
To explore validation and testing methods for decision making.
To gain knowledge on the tools such as MapReduce and hadoop

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Big Data:** Introduction to big data : Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting	8
2	**Mining data streams:** Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis- Stock Market Predictions.	7
3	**Hadoop:** History of Hadoop- the Hadoop Distributed File System – Components of Hadoop Analysing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce FeaturesHadoop environment.	7
4	**Framework:** Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams.	7
5	**Predictive Analysis:** Simple linear regression- Multiple linear regression- Interpretation of regression coefficients. Visualizations - Visual data analysis techniques- interaction techniques - Systems and applications.	7

COURSE OUTCOMES: The students would have learnt

CO1: Identify Big Data and its Business Implications.
CO2: List the components of Hadoop and Hadoop Eco-
System CO3: Access and Process Data on Distributed File
System CO4: Manage Job Execution in Hadoop
Environment
CO5: Develop Big Data Solutions using Hadoop Eco System

Text Books:

1. Intelligent Data Analysis, Michael Berthold, David J. Hand, Springer, 2007.
2. Hadoop: The Definitive Guide, Tom White, Third Edition, O'reilly Media, 2012.
3. Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,, McGrawHill Publishing, 2012.
4. Mining of Massive Datasets, Anand Rajaraman and Jeffrey David Ullman, CUP, 2012.
5. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics Bill Franks, John Wiley& sons, 2012.
6. Making Sense of Data, Glenn J. Myatt, John Wiley & Sons, 2007.
7. Big Data Glossary, Pete Warden, O'Reilly, 2011.

Reference Books:

1. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, 2nd Edition, Elsevier, Reprinted 2008.
2. Intelligent Data Mining, Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, Springer, 2007.
3. Harness the Power of Big Data The IBM Big Data Platform Paul Zikopoulos, Dirkde Roos, Krishnan Parasuraman, Thomas Deutsch, James, Giles , David Corrigan, Tata McGraw Hill Publications, 2012.
4. Big Data Science & Analytics: A HandsOn Approach, Arshdeep Bahga, Vijay Madisetti, VPT, 2016
5. Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series), Bart Baesens, John Wiley & Sons,2014

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: **1-Sightly; 2-Moderately; 3-Strongly**

Sub Title: SOFT COMPUTING		
Sub Code: IT208TOE01	No. of Credits :3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

To familiarize with soft computing concepts.
To introduce the fuzzy logic concepts, fuzzy principles and relations.
To Basics of ANN and Learning Algorithms.
ANN as function approximation.
Genetic Algorithm and its applications to soft computing.
Hybrid system usage, application and optimization.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to ANS Technology**: Elementary Neurophysiology, models of a neuron, neural networks viewed as directed graphs, feedback from neurons to ANS, artificial intelligence and neural networks.	8
2	**Learning & Training:** Hebbian memory based, competitive, error-correction. **Learning Credit Assignment Problem:** supervised and unsupervised learning, memory models, recall and adaptation, network architecture, single layered feed forward networks, multilayered feed forward networks, recurrent networks, topologies.	7
3	Activation and Synaptic dynamics, stability and convergence. **A suevey of neutral network models:** Single layered perception, least mean square algorithm, multi-layered perceptrons, back propagation algorithm XOR- problem, the generalized delta rule, BPN applications, Adalines and Madalines- Algorithm and applications.	7
4	**Applications:** The traveling salesperson problem, talking network and phonetic typewriter: Speech generation and Speech recognition, character recognition and retrieval, handwritten digital recognition.	7
5	**Adaptive fuzzy systems:** Introduction to Fuzzy sets, and operations, Examples of Fuzzy logic, Fuzzy Associative memories, fuzziness in neural networks, comparison of fuzzy and neural Truck-Backer upper control systems.	7

COURSE OUTCOMES: The students would have learnt

CO1: List the facts and outline the different process carried out in fuzzy logic, ANN and Genetic Algorithms.
CO2: Explain the concepts and meta-cognitive of soft computing.
CO3: Apply Soft computing techniques the solve character recognition, pattern classification, regression and similar problems.
CO4: Outline facts to identify process/procedures to handle real world problems using soft computing.
CO5: Evaluate various techniques of soft computing to defend the best working solutions.
CO6: Design hybrid system to revise the principles of soft computing in various applications.

Text Books:

1. Artificial Neural Networks by B. Yagna Narayan
2. Neural Networks by James A. Freeman and David

M.Strapetus Reference Books:

1. Neural Networks- A comprehensive foundation by Simon Hay kin (LPE)

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	1	1	1	1	1	1	2	2	2	1
CO2	2	2	3	3	3	1	1	1	1	1	1	1	2	2	1
CO3	3	2	2	1	2	1	1	1	1	1	1	2	3	2	1
CO4	3	3	2	3	2	1	1	1	1	1	1	3	2	2	1
CO5	3	2	3	2	2	1	1	1	1	1	1	2	2	2	1
CO6	2	3	3	2	2	1	1	1	1	1	1	2	3	2	1

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
CS208TOE01	3	0	0	3 hours	30	70	3

ARTIFICIAL INTELLIGENCE

Course Objectives:

To introduce the fundamentals of Artificial Intelligence and its subfields, including problem-solving, knowledge representation, handling uncertainty and learning, natural language processing, and planning.

2. To familiarize students with various search techniques, including blind search, informed search, and constraint satisfaction, used in solving AI problems.
3. To enable students to understand the importance of knowledge representation and its various techniques, including rule-based systems and semantic nets, in building AI systems.
4. To introduce students to the concepts of uncertainty and learning in AI, including probabilistic inference, fuzzy logic, and machine learning, and their applications in real-world problems.
5. To equip students with the ability to design and develop simple expert systems using AI languages such as Prolog and Lisp.

UNIT I Overview & Search Techniques:

Introduction to AI, Problem Solving, State space search, Blind search: Depth first search, Breadth first search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Constraint satisfaction. Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.

UNIT II Knowledge Representation (KR):

Introduction to KR, Knowledge agent, Predicate logic, WFF, Inference rule & theorem proving forward chaining, backward chaining, resolution; Propositional knowledge, Boolean circuit agents. Rule Based Systems, Forward reasoning: Conflict resolution, backward reasoning: Use of Back tracking, Structured KR: Semantic Net - slots, inheritance, Frames- exceptions and defaults attached predicates, Conceptual Dependency formalism and other knowledge representations.

UNIT III Handling uncertainty & Learning:

Source of uncertainty, Probabilistic inference, Bayes' theorem, Limitation of naïve Bayesian system, Bayesian Belief Network (BBN), Inference with BBN, Dempster-Shafer Theory, Fuzzy Logic, Fuzzy function, Fuzzy measure, Non monotonic reasoning: Dependency directed backtracking, Truth maintenance systems. Learning: Concept of learning, Learning model, learning decision tree, Paradigms of machine learning, Supervised & Unsupervised learning, Example of learning, Learning by induction, Learning using Neural Networks.

UNIT IV Natural Language Processing (NLP) & Planning:

Overview of NLP tasks, Parsing, Machine translation, Components of Planning System, Planning agent, State-Goal & Action Representation, Forward planning, backward chaining, Planning example: partial-order planner, Block world.

UNIT V Expert System & AI languages:

Need & Justification for expert systems- cognitive problems, Expert System Architectures, Rule based systems, Non production system, knowledge acquisition, Case studies of expert system. Ai language: Prolog syntax, Programming with prolog, backtracking in prolog, Lisp syntax, Lisp programming.

Text Books:-

1. Artificial Intelligence by Elaine Rich and Kevin Knight, Tata MeGraw Hill. 2. Introduction to Artificial Intelligence and Expert Systems by Dan W.Patterson, Prentice Hall of India.

Reference Books:-

1. Principles of Artificial Intelligence by Nils J.Nilsson, Narosa Publishing house.
2. Programming in PROLOG by Clocksin & C.S. Melish, Narosa Publishing house. 3. Rule based Expert Systems-A practical Introduction by M. Sasikumar, S.Ramani, et. al., Narosa Publishing House.

Course Outcome:

1. Students will be able to understand the fundamentals of Artificial Intelligence and its subfields, including their applications in real-world problems.
2. Students will be able to apply various search techniques to solve AI problems and evaluate their effectiveness.
3. Students will be able to design and develop AI systems using knowledge representation techniques, including rule-based systems and semantic nets.
4. Students will be able to understand and apply the concepts of uncertainty and learning in AI, including probabilistic inference, fuzzy logic, and machine learning, in solving real-world problems.
5. Students will be able to design and develop simple expert systems using AI languages such as Prolog and Lisp.

Sub Title: ENTERPRISE RESOURCE MANAGEMENT		
Sub Code: CS208TOE09	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

To discuss the fundamental concepts an enterprise and its integration of major functions

To discuss the various technologies used for an ERP.

To discuss importance of information in an organization.

To discuss Material resource management, forecasting and job scheduling

To discuss Software implementation methods and various other related issues

UNIT No	Syllabus Content	No of Hours
1	**Function of Business Organizations:** Personnel management, Financial management, marketing management, Sales order Processing , Manufacturing managements , Human Resource Management etc , data and information , Operation of functional areas. Integrated view of ERP	8
2	**Technologies of ERP:** knowledge based system , Decision support system , Executive information system , Electronic commerce, , Databases system , Business Engineering , Business process Engineering , Networking , 3 tier and 2 tier architecture.	7
3	**Management information system:** MIS, data & information, levels of Management , information requirement , objectives of information channels, information strategies	7
4	**Information and planning:** Resource management benefit of management planning process objective and its characteristic , policy and procedures ,forecasting and its varies aspects . Scheduling , MRP , MRP-II	7
5	**ERP implement issues:** software development life cycle , pre Evaluation schemes , post implement issues, case studies .	7

COURSE OUTCOMES: The students would have learnt

CO1: Basic concepts of an enterprise functions and its integration for ERP. CO2: Introduction of different technologies related to ERP.
CO3: Importance of an information for all levels of organization. CO4: Concepts of ERP for the manufacturing perspective

Text Books:

1. Enterprise resource planning by Alixis Leon TMH
2. Management Information System by Jawardekar

Reference Books:

1. Kinematics and Synthesis of linkages –Hartenberg and Denavit– McGrew Hill Book Co
2. ERP by Garg and Ravichandran
3. Management Information Systems : Louden & Louden
4. Information System and MIS : J Kanter

Course Outcomes and their mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	3	2	1	1	3	1	1	1	0	3	3	2	2
CO2	1	3	3	2	3	1	2	1	1	2	0	3	3	3	2
CO3	2	1	3	2	1	1	1	2	2	2	2	3	3	1	2
CO4	2	1	3	2	1	1	3	1	1	1	0	3	3	1	2
CO5	1	1	3	1	3	1	3	1	3	1	2	3	1	2	2

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: INFORMATION RETRIEVAL SYSTEMS		
Sub Code: CS208TOE10	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

Demonstrate genesis and diversity of information retrieval situations for text and hyper media.

Describe hands-on experience store, and retrieve information from www using semantic approaches.

Demonstrate the usage of different data/file structures in building computational search engines.

Analyze the performance of information retrieval using advanced techniques such as classification, clustering, and filtering over multimedia.

Analyze ranked retrieval of a very large number of documents with hyperlinks between them.

UNIT No	Syllabus Content	No of Hours
1	**Retrieval Strategies:** vector space model, Probabilistic retrieval strategies: Simple term weights, Non binary independence model, Language models.	8
2	**Retrieval Utilities:** Relevance feedback, clustering, N-grams, Regression analysis, Thesauri	7
3	**Retrieval Utilities:** Semantic networks, parsing Cross – Language: Information Retrieval: Introduction, Crossing the Language barrier.	7
4	**Efficiency:** Inverted Index, Query processing, Signature files, Duplicate document detection.	7
5	Integrating structured data and text. A historical progression, Information retrieval as relational application, Semi Structured search using a relational schema. Distributed Information Retrieval: A theoretical Model of Distributed retrieval, web search	7

COURSE OUTCOMES: The students would have learnt

CO1: Describe the objectives of information retrieval systems.
CO2: Describe models like vector-space, probabilistic and language models to identify the similarity of query and document
CO3: Implement clustering algorithms like hierarchical agglomerative clustering and k-means algorithm.
CO4: Understand relevance feedback in vector space model and probabilistic model. CO5: Understand query, document and phrase translation.

Text Books:

1. Information Retrieval – Algorithms and Heuristics, David A. Grossman, Ophir Frieder, Springer, 2nd Edition (Distributed by Universal Press), 2004

Reference Books:

1. Information Storage and Retrieval Systems: Theory and Implementation, Gerald J Kowalski, Mark T Maybury Springer, 2004.
2. Mining the Web: Discovering Knowledge from Hypertext Data, Soumen Chakrabarti, Morgan – Kaufmann Publishers, 2002.
3. An Introduction to Information Retrieval, By Christopher D Manning, Prabhakar Raghavan, Hinrich Schutze, Cambridge University Press, England, 2009.

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: WIRELESS SENSOR NETWORK		
Sub Code: CS208TOE11	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

Understand the fundamentals of wireless networks.
Understand deployment of sensor in Wireless Sensor Network.
Understand design considerations for wireless networks.
Understand the different routing techniques of Wireless Sensor Network.
Understand the different challenges of Wireless Sensor Network.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Wireless Sensor Network: Introduction, Architecture, Hardware and Software used in Wireless Sensor Network.	8
2	**Applications:** Sensor network application: Motion monitoring, Environmental monitoring, Generic Architecture, Sensor network Evolution.	7
3	**Design And Deployment:** Wireless Sensor Network : Design , Goals and Issues , Sensor deployment, Scheduling and coverage issues, self-configuration and topology control, Querying, data collection and processing, Collaborative information processing and group connectivity.	7
4	**Routing:** Wireless Sensor Routing Protocols: Data Centric, Hierarchical, Location based, Energy efficient routing.	7
5	**Challenges:** Sensor Network Challenges-Miniaturization, Power management, Scalability, Remote management, Usability, Standardization and security, System Challenges- Tiny OS, Network Sensor Platforms.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the basic concepts of wireless network.
CO2: Understand the different applications of Wireless sensor network. CO3: Understand the designing concept of Wireless Sensor Network. CO4: Understand the different challenges of Wireless Sensor Network. CO5: Services and layer wise security considerations.

Text Books:

1. Building Wireless Sensor Networks by Robert Faludi Binding: Paperback Publisher: O'reilly Released: 2011
2. Wireless Sensor Networks by Zhao Feng, Guibas Leonidas Binding: Paperback Publisher: Elsevier India Released: 2004

Reference Books:

1. Wireless Sensor Networks by C. S Raghavendra, Krishna M. Sivalingam, Taieb Znati Binding: Paperback Publisher: Springer/bsp Books Released: Rpt.2010

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: MACHINE LEARNING		
Sub Code: CS208TOE12	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

To expose the applications of machine learning.
To study the various algorithms related to supervised and unsupervised learning.
To recognize the different types of machine learning models and how to use them.
To learn the theoretical and practical aspects of probabilistic graphical models.
To acquire the knowledge of various classification techniques.
To learn the various neural network algorithms.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Machine Learning:** Introduction - examples of machine learning applications - Types of machine learning- Mathematical foundations of machine learning– Introduction to Parametric Models – Non-Parametric Models –Probability Basics	8
2	**Supervised Learning:** Linear Models for Regression – Linear Basis Function Models - The Bias-Variance Decomposition - Bayesian Linear Regression - Bayesian Model Comparison, Limitations of Fixed Basis Functions - Linear Models for Classification, Discriminant Functions -Probabilistic Generative Models –Probabilistic Discriminative Models - Bayesian Logistic Regression. Neural Networks – Network Training - Feed-forward Network Functions, Back Propagation Network, Bayesian Neural Network	7
3	**Unsupervised Learning:** Clustering- K-means - EM Algorithm- Mixtures of Gaussians Dimensionality Reduction - Factor analysis - Principal Component Analysis Probabilistic PCA -Independent components analysis - Singular Value Decomposition.	7
4	**Probabilistic Graphical Model:** Graphical Models - Undirected graphical models - Markov Random Fields-Directed Graphical Models -Bayesian Networks - Conditional independence properties - Inference – Learning - Generalization - Hidden Markov Models -Conditional random fields	7
5	**Genetic Algorithms:** an illustrative example, Hypothesis space search, Genetic Programming, Models of Evolution and Learning; Learning first order rules-sequential covering algorithms-General to specific beam search-FOIL; REINFORCEMENT LEARNING – The Learning Task, Q Learning.	7

COURSE OUTCOMES: The students would have learnt

CO1: Describe the concepts and models of machine learning.
CO2: Design and implement algorithms for supervised and unsupervised learning.
CO3: Develop skills of using recent machine learning software for solving practical problems. CO4: Analyze the efficient clustering techniques for solving real world problems.
CO5: Implement probabilistic discriminative and generative algorithms for an application and analyze the results.

Text Books:

1. Machine Learning: A Probabilistic Perspective, Kevin Murphy, MIT Press, 20122.
2. Pattern Recognition and Machine Learning, Christopher Bishop. 2e
3. Machine Learning, Tom M. Mitchell, McGraw-Hill Education (India) Private Limited, 2013

Reference Books:

1. Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 1st edition, ISBN- 13: 978-0387-31073-2, 2006.
2. Introduction to Machine Learning, Ethem Alpaydin, 3rd Edition, MIT Press, ISBN: 9780262028189, 2014.
3. Machine Learning: a Probabilistic Perspective, Kevin Patrick Murphy , 4th edition, MIT Press, ISBN:9780262018029, 2013.
4. Machine Learning for Hackers, Drew Conway, John Myles White, 1st Edition, O'Reilly Media, 2012.
5. Data Mining: Practical Machine Learning Tools and Techniques, Ian H. Witten, Eibe Frank, Mark A. Hall, 3rd Edition, Morgan Kaufmann, 2011.

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: **1-Sightly; 2-Moderately; 3-Strongly**

Sub Title: NETWORK SECURITY LAB	
Sub Code: CS208PPE01	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

To train more professional in the area of Network Security
To support in developing vulnerability free web applications
To support industry in Cyber security research

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Implement Caesar cipher encryption-decryption. • Implement Monoalphabetic cipher encryption-decryption. • Implement Playfair cipher encryption-decryption. • Implement Polyalphabetic cipher encryption-decryption. • Implement Hill cipher encryption-decryption. • To implement Simple DES or AES. • Implement Diffi-Hellmen Key exchange Method. • Implement RSA encryption-decryption algorithm. • Write a program to generate SHA-1 hash. • Implement a digital signature algorithm. • Perform various encryption-decryption techniques with cryptool. • Study and use the Wireshark for the various network protocols.	18

LAB OUTCOMES: The students would have learnt

CO1: Define the concepts of Information security and their use.
CO2: Describe the principles of symmetric and asymmetric cryptography. CO3: Understand and apply the various symmetric key algorithms.
CO4: Understand and apply the various asymmetric key algorithms.

Text Books:

1. Cryptography And Network Security, Principles And Practice Sixth Edition, William Stallings, Pearson
2. Information Security Principles and Practice By Mark Stamp, Willy India Edition
3. Cryptography & Network Security, Forouzan, Mukhopadhyay, McGrawHill

Reference Books:

1. Fundamentals of computer Algorithms, Horowitz, Sahani, Galgotia. 2nd Edition, 1998.ISBN 81- 7515-257-5
2. Cryptography and Network Security Atul Kahate, TMH
3. Cryptography and Security, C K Shyamala, N Harini, T R Padmanabhan, Wiley-India
4. Information Systems Security, Godbole, Wiley-India
5. Information Security Principles and Practice, Deven Shah, Wiley-India
6. Security in Computing by Pfleeger and Pfleeger, PHI
7. Build Your Own Security Lab : A Field Guide for network testing, Michael Gregg, Wiley India

Course Outcomes and their mapping with Programme Outcomes:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO 2	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO 3	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO 4	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO 5	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO 6	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: MOBILE APPLICATION DEVELOPMENT LAB	
Sub Code: CS208PPE02	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

To understand the components and structure of mobile application development frameworks for Android and windows 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.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Develop an application that uses GUI components, Font and Colours • Develop an application that uses Layout Managers and event listeners. • Write an application that draws basic graphical primitives on the screen. • Develop an application that makes use of databases. • Develop an application that makes use of Notication Manager • Implement an application that uses Multi-threading • Develop a native application that uses GPS location information • Implement an application that writes data to the SD card. • Implement an application that creates an alert upon receiving a message • Write a mobile application that makes use of RSS feed • Develop a mobile application to send an email. • Develop a Mobile application for simple needs (Mini Project)	18

LAB OUTCOMES: The students would have learnt

CO1: Develop mobile applications using GUI and Layouts
CO2: Develop mobile applications using Event Listener.
CO3: Develop mobile applications using Databases.
CO4: Develop mobile applications using RSS Feed, Internal/External Storage, SMS, Multi- threading and GPS.
CO5: Analyze and discover own mobile app for simple needs

Text Books:

1. Build Your Own Security Lab, Michael Gregg, Wiley India.

Reference Books:

1. Build Your Own Security Lab, Michael Gregg, Wiley India.

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: CLOUD COMPUTING LAB	
Sub Code: CS208PPE03	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

To discuss the fundamental concepts of Cloud Computing
To learn how to use install and configure Hadoop/MapReduce/HDFS
To learn how to create application using Hadoop/MapReduce
To learn Various Cloud services provided by Amazon Web Service etc.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Installation and configuration of Hadoop/MapReduce/HDFS • Service deployment and usage over cloud. • Create an application using Hadoop/MapReduce • Case Study: Google App Engine/ Microsoft Azure/ Amazon Web Services	18

LAB OUTCOMES: The students would have learnt

CO1: Examine the installation and configuration of Hadoop/Map Reduce CO2: Describe the functioning of Platform as a Service
CO3: Create application using Hadoop/MapReduce
CO4: Analyze and understand the functioning of different components involved in Amazon web services cloud platform.

Text Books:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya,James Broberg, Andrzej M. Goscinski, Wiley.
2. Cloud Computing" by M. N. Rao, PHI.
3. Cloud Computing: A Practical Approach" by Toby Velte, Anthony Vote and Robert Elsenpeter, McGraw Hill.Reference Books:

1. Cloud Computing Bible", Barrie Sosinsky, Wiley India Edition.
2. Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Ronald L. Krutz, Russell Dean Vines, Wiley- India,2010

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: 1-Slightly; 2-Moderately; 3-Strongly;

Sub Title: BIG DATA ANALYSIS LAB	
Sub Code: CS208PPE04	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

Learn Injecting data into Hadoop
Learn to build and maintain reliable, scalable, distributed systems with Hadooop
Able to apply Hadoop ecosystem components.
To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
To enable students to have skills that will help them to solve complex real-world problems in for decision support.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Study of Hadoop ecosystem • Programming exercises on Hadoop • Programming exercises in No SQL • Implementing simple algorithms in Map- Reduce (3) - Matrix multiplication, Aggregates, joins, sorting, searching etc. • Implementing any one Frequent Itemset algorithm using Map-Reduce • Implementing any one Clustering algorithm using Map-Reduce • Implementing any one data streaming algorithm using Map-Reduce • Mini Project: One real life large data application to be implemented (Use standard Datasets available on the web) a) Twitter data analysis b) Fraud Detection c) Text Mining etc.	18

LAB OUTCOMES: The students would have learnt

CO1: Preparing for data summarization, query, and analysis.
CO2: Applying data modelling techniques to large data sets
CO3: Creating applications for Big Data analytics
CO4: Building a complete business data analytic solution

Text Books:

1. Intelligent Data Analysis, Michael Berthold, David J. Hand, Springer, 2007.

2. Hadoop: The Definitive Guide, Tom White, Third Edition, O'reilly Media, 2012.
3. Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,, McGrawHill Publishing, 2012.
4. Mining of Massive Datasets, Anand Rajaraman and Jeffrey David Ullman, CUP, 2012.
5. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Bill Franks, John Wiley& sons, 2012.
6. Making Sense of Data, Glenn J. Myatt, John Wiley & Sons, 2007.
7. Big Data Glossary, Pete Warden, O'Reilly, 2011.

Reference Books:

1. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, 2nd Edition, Elsevier, Reprinted 2008.
2. Intelligent Data Mining, Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, Springer, 2007.
3. Harness the Power of Big Data The IBM Big Data Platform Paul Zikopoulos, Dirkde Roos, Krishnan Parasuraman, Thomas Deutsch, James, Giles , David Corrigan, Tata McGraw Hill Publications, 2012.
4. Big Data Science & Analytics: A HandsOn Approach, Arshdeep Bahga, Vijay Madisetti, VPT, 2016
5. Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series), Bart Baesens, John Wiley & Sons,2014

Course Outcomes and their mapping with Programme Outcomes:

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

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

SubTitle:ADVANCED DATA STRUCTURE		
SubCode:CSPATT1	No.ofCredits: 3=3:0:0 (L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSEOBJECTIVE:

1. The fundamental design, analysis, and implementation of basic data structures.
2. Basic concepts in the specification and analysis of programs.
3. Principles for good program design, especially the uses of data abstraction.
4. Significance of algorithms in the computer field
5. Various aspects of algorithm development
6. Qualities of a good solution

UNIT No	SyllabusContent	Noof Hours
1	Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples. Data structures-Linear and non-linear data structures, ADT concept, Linear List ADT, Array representation, Linked representation,Vector representation, singly linked lists - insertion, deletion, search operations, doubly linked lists-insertion, deletion operations, circular lists. Representation of single, two-dimensional arraysand their representation.	10
2	Stack and Queue ADTs, array and linked list representations, infix to postfix conversion using stack,implementation of recursion, Circular queue-insertion and deletion, Dequeue ADT, array and linked list representations, Priority queue ADT, implementation using Heaps, Insertion into a Max Heap, Deletion from a Max Heap, ArrayList, Linked List, Vector classes, Stacks and Queues.	10
3	Searching–Linear and binary search methods, Hashing-Hash functions, Collision Resolution Methods-Open Addressing, Chaining, Hashing, HashMap, HashSet, Hashtable. Sorting –Bubble sort, Insertion sort, Quick sort, Merge sort, Radix sort, comparison of sorting methods.	08
4	Search trees- Binary search tree-Binary search tree ADT, insertion, deletion and searching operations, Balanced search trees, AVL trees-Definition and examples only, Red Black trees – Definition and examples only, B-Trees-definition, insertion and searching operations, Trees, TreeSet, Tree Map Classes, Comparison of Search trees.	10
5	Trees- Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT, representations, recursive and non-recursive traversals, Threaded binary trees. Graphs- Graphs terminology, Graph ADT, representations, graph traversals/search methods-DFS and BFS, Application of Graph and algorithm. Heap Data structure: Fibonacci heap, Binomial heap, Binary heap.	10

COURSEOUTCOMES: Thestudentswouldhavelearnt

1. Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class.
2. Master a variety of advanced abstract data type (ADT) and data structures and their implementation's.
3. Master different algorithm design techniques (brute-force, divide and conquer, greedy, etc
4. Ability to apply and implement learned algorithm design techniques and data structures to solve problems.

TextBooks:

1. S. Sahni, "Data structures, Algorithms and Applications in Java", Universities Press. [ISBN:0-07-109217-x]
2. Adam Drozdek, "Data structures and Algorithms in Java", 3rd edition, Cengage Learning. [ISBN:978-9814239233]

ReferenceBooks:

1. R.Lafore "Data structures and Algorithms in Java", Pearson education. ISBN: 9788 131718124.
2. J.P.Tremblay and G.A.Cheston "Data structures and Software Development in an ObjectOriented Domain", Java edition, Pearson Education.

Sub Title: Advanced Data Structure Lab	
Sub Code: CSPALT1	No. of Credits: 2=0:0:2(L-T-P)
Exam Duration:3 hours	IA+ESE =30+20

COURSEOBJECTIVE:

1. The fundamental design, analysis, and implementation of basic data structures.
2. Basic concepts in the specification and analysis of programs.
3. Principles for good program design, especially the uses of data abstraction.
4. to understand the sorting techniques
5. to understand the non linear data structures
6. to learn bout the pattern matching

UNIT	Data structures:	Noof Hours
UNIT I,II, III, IV, V	1. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods: a) Linear search b) Binary search 2. Write Java programs to implement the following using arrays and linked lists a) List ADT. 3. Write Java programs to implement the following using an array. a) Stack ADT b) Queue ADT 4. Write a Java program that reads an infix expression and converts the expression to postfix form. (Use stack ADT). 5. Write a Java program to implement circular queue ADT using an array. 6. Write a Java program that uses both a stack and a queue to test whether the given string is a palindrome or not. 7. Write Java programs to implement the following using a singly linked list. a) Stack ADT b) Queue ADT 8. Write Java programs to implement the deque (double ended queue) ADT using a) Array b) Singly linked list c) Doubly linked list. 9. Write a Java program to implement priority queue ADT. 10. Write a Java program to perform the following operations: a) Construct a binary search tree of elements. b) Search for a key element in the above binary search tree. CSE 2014-2015 SR Engineering College 21 c) Delete an element from the above binary search tree. 11. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing. 12. Write a Java program to implement Dijkstra's algorithm for Single source shortest path problem. 13. Write Java programs that use recursive and non-recursive functions to traverse the given binary tree in a) Preorder b) Inorder c) Postorder. 14. Write Java programs for the implementation of bfs and dfs for a given graph. 15. Write Java programs for implementing the following sorting methods: a) Bubble sort d) Merge sort g) Binary tree sort b) Insertion sort e) Heap sort c) Quick sort f) Radix sort 16. Write a Java program to perform the following operations: a) Insertion into a B-tree b) Searching in a B-tree 17. Write a Java program that implements Kruskal's algorithm to generate minimum cost spanning tree. 18. Write a Java program that implements KMP algorithm for pattern matching.	24

COURSEOUTCOMES: Thestudentswouldhavelearnt

1. Basic ability to analyze algorithms and to determine algorithm correctness and time Efficiency class.
2. Master a variety of advanced abstract data type (ADT) and data structures and their Implementations.
3. Master different algorithm design techniques (brute-force, divide and conquer, greedy, etc.)
4. Ability to apply and implement learned algorithm design techniques and data structures to solve problems

ReferenceBooks:

1. A. Drozdek "Data Structures and Algorithms in java", 3rd edition, Cengage Learning.
2. J. R. Hubbard, "Data Structures with Java", 2nd edition, Schaum's Outlines, TMH. (Note: Use packages like java.io, java.util, etc)

SubTitle:Advanced Computer Network		
SubCode:CSPATT2	No.ofCredits: 3=3:0:0 (L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSEOBJECTIVE:

1. Demonstrate in-depth knowledge in the area of Computer Networking.
2. To demonstrate scholarship of knowledge through performing in a group to identify, formulate and solve a problem related to Computer Networks.
3. Prepare a technical document for the identified Networking System.
4. Analyze the identified research work in building Computer Networks.

UNIT No	SyllabusContent	NoofHours
1	**Introduction to the Link Layer:** Services of Link Layer, Error-Detection and-Correction Techniques: Parity Checks, Check summing Methods, Cyclic Redundancy Check (CRC), Multiple Access Links and Protocols: Channel Partitioning Protocols, Random Access Protocols, Taking-Turns Protocols DOCSIS, Switched Local Area Networks, Multiprotocol Label Switching (MPLS)	10
2	**Data Forwarding and Routing:** Introduction, Forwarding and Routing, Network Service Models, Virtual Circuit and Datagram Networks, Virtual-Circuit Networks, Datagram Networks, Origins of VC and Datagram Networks, Router: Input Processing, Switching , Output Processing, The Internet Protocol (IP): Forwarding and Addressing in the Internet, Datagram Format, IPv4, Addressing, Internet Control Message Protocol (ICMP), IPv6: IP Security, Routing Algorithms: The Link-State (LS) Routing Algorithm, The Distance-Vector (DV) Routing Algorithm, Hierarchical Routing, Routing in the Internet: Intra-AS Routing in the Internet: RIP, Intra-AS Routing in the Internet: OSPF, Inter-AS Routing: BGP, Broadcast and Multicast Routing: Broadcast Routing Algorithms, Multicast	10

3	**Transport Layer:** Introduction and Transport-Layer Services, Relationship Between Transport and Network Layers, Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing, Connectionless Transport: UDP, UDP Segment Structure, UDP Checksum, Principles of Reliable Data Transfer, Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N (GBN), Selective Repeat (SR), Connection-Oriented Transport: TCP, The TCP Connection, TCP Segment Structure, Round Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control	12
4	**Wireless and Mobile Networks:** Introduction, Wireless Links and Network Characteristics: CDMA, Wireless LANs: The 802.11 Architecture, The 802.11 MAC Protocol, The IEEE 802.11 Frame, Mobility in the Same IP Subnet, Advanced Features in 802.11, Personal Area Networks: Bluetooth and Zigbee, Cellular Internet Access, An Overview of Cellular Network Architecture, 3G Cellular Data Networks: Extending the Internet to Cellular subscribers, On to 4G: LTE, Mobility Management: Principles: Addressing, Routing to a Mobile Node, Mobile IP, Managing Mobility in Cellular Networks: Routing Calls to a Mobile User, Handoffs in GSM, Wireless and Mobility: Impact on Higher-Layer Protocols.	10
5	**Network Management:** Overview of Network Management, The Infrastructure for Network Management, The Internet-Standard Management Framework, Structure of Management Information: SMI, Management Information Base: MIB, SNMP Protocol Operations and Transport Mappings, Security and Administration.	10

COURSEOUTCOMES: Thestudentswouldhavelearnt

CO1: Understand the general principles of Computer Network.
CO2: Differentiate between different LAN-based forwarding devices so that they can make thoughtful suggestions on how to build a network.
CO3: Evaluate the challenges in building networks and solutions.
CO4: Design and implement networking applications.

Text Books:

1. Ross, Computer Networking A Top down Approach, James F. Kurose, Keith W, Pearson.
2. TCP/IP Protocol Suite , Behrouz A Forouzan, Tata Mc Graw-Hill .
3. Data communications and Networking, Behrouz A Forouzan, Tata Mc Graw-Hill 5th edition.

Reference Books:

1. Larry Peterson and Bruce S Davis "Computer Networks :A System Approach" , Elsevier
2. Douglas E Comer, "Internetworking with TCP/IP, Principles, Protocols and Architecture", PHI.

Subject: CSPATC1	Research Methodology and IPR (IPPATC1)	Credits			
		L	T	P	Total
Teaching Scheme:	Lectures: 2 hours/week	2	0	0	2

Course outcomes:	At the end of the course, students will be able to
1	Understand research problem formulation.
2	Analyze research related information
3	Follow research ethics
4	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property
5	Right to be promoted among students in general & engineering in particular.
6	Understand research problem formulation.

Syllabus Contents:

- **Introduction and Design of research**: Meaning, objectives and significance of research, types and parameters of research, research process, identification and definition of the research problem, definition of construct and variables, pure and applied research design, exploratory and descriptive design methodology, qualitative vs. quantitative research methodology, field studies, field experiments vs. laboratory experiments, research design in social and physical sciences.

- **Data and Methods of Data Collection**: Survey, assessment and analysis: data collection, primary and secondary sources of data, Collection of primary data through questionnaire and schedules. Collection of secondary data, processing and analysis of data. Sample survey, simple random sampling, stratified random sampling, systematic sampling, cluster sampling, area sampling and multistage sampling. Pilot survey, scaling techniques, validity & reliability.

- **Data Analysis:** Procedure for testing of hypothesis, the null hypothesis, determining levels of significance, type i and ii errors, grouped data distribution, measures of central tendency, measures of spread/dispersion, normal distribution, analysis of variance: one way, two way, chi square test and its application, students 'T' distribution, non-parametric statistical techniques, binomial test. Correlation and regression analysis – discriminate analysis – factor analysis – cluster analysis, measures of relationship

- Research report preparation and presentation: Review of literature: historical survey and its necessity, layout of research plan, meaning, techniques and precautions of interpretation, types of report: technical report, popular report, report writing – layout of research report, mechanics of writing a research report. Writing bibliography and references.

- Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and

Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.
References:
• Research in education, By J W Best and J V Kahn, Pearson/ Allyn and Bacon. • Research Methodology – Methods and Techniques, C K Kothari, New Age International. • Design and Analysis of Experiments, D C Montgomery, Wiley. • Applied Statistics & Probability for Engineers, D C Montgomery & G C Runger, Wiley. • Management Research Methodology: Integration of Principles, Methods and Techniques, K N Krishnaswamy, A I Sivakumar and M Mathiranjan, Pearson Education.

SubTitle: LOGICs IN COMPUTER SCIENCE		
SubCode:CSPATP1	No.ofCredits: 3=3:0:0 (L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSEOBJECTIVE:

1. To introduce the concept of mathematical logics and its importance.
2. To discuss propositional, predicate, temporal and modal logic and its applications.

UNIT No	Syllabus Content	No of Hours

1	**LOGICS FUNDAMENTALS** Mathematical Logic, Prepositional Logic, First Order Logic, Modal and Temporal Logic.Prepositional Logic: Formulae and interpretations, Equivalance satisfiability & validity, Semantic Tableaux, Soundness and Completeness.	10
2	**Hilbert Deductive Systems:** Hilbert Deductive systems, Derived Rules, Theorems and operators, Soundness and Completeness and Consistency. Resolution and propositional Logic: Conjunctive Normal form, Clausal form, resolution rule.	10
3	**Binary Decision Diagrams** Definition, reduced and ordered BDD,Operators. Predicate Logic: Relations, predicates, formulae and interpretation, logic equivalence, semantic tableaux, soundness.	12
4	**Resolution in Predicate Logic** The Hilbert deduction system for predicate logic, PCNF and clausal form, Her brand model. Resolution in predicate logic: ground resolution, substitution, unification and general resolution.	10
5	**Temporal Logic: Syntax and semantics, models of time, linear time temporal logic, semantic tableaux, Deduction system for temporal logic.** **Program Verification: -Need for verification, Framework for verification, Verification of sequential programs, deductive systems, verification, synthesis.**	10

COURSEOUTCOMES: Student will be able to

CO1:Explain the concept of logic and its importance.
CO2:Understand fundamental concepts of preposional
logic and apply resolution techniques
CO3:Understand fundamental concepts of predicate logic and apply resolution techniques
CO4:Understand fundamental concepts of temporal logic and apply resolution techniques

Textbooks:

- Modechai Ben Ari, Mathematical logic for computer science, Springer 3E, 2102.
- Arindhama Singh, Logics for Computer Science, Prentice Hall India, 2004.

Reference Books:

1. Michael Huth, Mark Ryan, Logics in Computer Science: Modelling and reasoning about systems, Cambridge University Press, 2005.

Sub.Title: ADVANCEDCOMPUTER ARCHITECTURE		
SubCode:CSPATP2	No.ofCredits:3=3: 0:0(L-T-P)	No.oflecturehours/week:03
ExamDuration:3hours	IA+ESE=40+60	Totalno.ofcontacthours:21

COURSEOBJECTIVE:

1. Understand the Concept of Parallel Processing and its applications.
2. Learn the function of each element of a memory hierarchy.
3. Develop the Pipelining Concept for a given set of Instructions.
4. Analyze processor performance improvement using instruction level parallelism.
5. Distinguish the performance of pipelining and non-pipelining environment in a processor.
6. Learn multiprocessor architecture and advanced processor technology.

UNIT No	SyllabusContent	Noof Hours
1	**Multiprocessors and Multi-computers**; Uniprocessor and Multiprocessor Architecture, Flynn's Classification: SISD, SIMD, MISD, MIMD, Parallel Processing: Definition, Theory of Parallelism. Parallel Computer Models, Parallelism in Uni-Processor Computers, Implicit Parallelism vs. Explicit Parallelism, Levels of Parallelism. Software Parallelism, Hardware Parallelism, Amdahl's Law.	8
2	**Memory Technology:** Cache Design Issues, Locality of Reference , Cache Addressing Model, Cache Performance Issues, Interleaved Memory Organization, Multicore Architecture and Cache Coherence Problem.	8
3	**Pipelining:** Linear Pipeline processor, Asynchronous and Synchronous models, speed up, Efficiency, Throughput, Pipelining in MIPS architecture, Nonlinear Pipeline Processor, Instruction Pipeline, Arithmetic Pipeline. Conditions of Parallelism: Data and Resource Dependencies, Control Dependence, Resource Dependence, Hardware and Software Parallelism, Pipeline Hazards and their Resolution Mechanisms, Dynamic Instruction Scheduling, Advanced Pipelining.	9
4	**System Interconnect Architecture:** Static and Dynamic Networks, Network Properties: Network Size, Graph, Node Degree, Diameter, Bisection Width etc., Data Routing Functions: Permutation, Perfect shuffle exchange, Hypercube Routing function. Network Topologies for Multiprocessor: Linear Array, Ring, Star, Tree, Mesh, Systolic Array, Chordal Ring, Completely Connected Network, Cube Connected Cycles, Torus, K-ary-n Cube, Barrel Shifter, Single Stage Interconnection Network and Multistage Interconnection Networks.	8
5	**Advanced Processor Technology:** Instruction Set Architecture, RISC Processor, CISC Processor, Superscalar Processor, VLIW Architecture, Vector & Symbolic Processors, Case Study of Pentium Processor & SPARC.	7

COURSEOUTCOMES: Thestudentswouldhavelearnt

CO1: Analyze the parallelism and identify the conditions of parallelism.
CO2: Understanding memory hierarchy and cache design issues.
CO3: Understanding pipelined and non-pipelined processing.
CO4: Understand the system interconnection architecture.
CO5: Understand the concepts of advanced processor technology

Text Books:

1. Computer Architecture, Hennessy, J. L. and Patterson, D. A., Morgan Kaufmann.
2. Advanced Computer Architecture, Rajiv Chopra, S. Chand India.
3. Advanced Computer Architecture, Hwang, K., Tata McGraw-Hill.

ReferenceBooks:

1. Computer Architecture & Organization, J. P. Hayes, McGraw-Hill India.
2. Parallel Computing: Theory and Practice, Michael, J.Q., Tata McGraw-Hill.

Subject Title : MultiMedia System		
SubCode:CSPATP2	No.ofCredits: 3=3:0:0 (L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSE OBJECTIVE

1. Explain standard Multimedia system architecture
2. Compare the various types of compression available both for image and video.
3. To analyze different media and design issues related to multimedia systems.

UNIT	TOPIC	CONTACT HOURS
1	UNIT-I BASICS OF MULTIMEDIA TECHNOLOGY :-Multimedia -An introduction: Multimedia application, Multimedia system architecture, Evolving technologies for multimedia system, Defining objects for multimedia systems, Multimedia data interface standards. multimedia devices CD Audio. CD-ROM. CD-presentation devices	8
2	UNIT-2 IMAGE COMPRESSION & STANDARDS :- Making still images: Capturing images; scanning images; computer color models: color palettes; Losyy and lossless compression, JPEG-objectives and architecture: JPEG-DCT encoding and quantization, JPEG statistical coding; JPEG predictive loss less coding; JPEG performance; Overview of video coding standardsMPEG-1, MPEG-2, MPEG-4, MPEG-7.	8
3	UNIT-3- MULTIMEDIA WEB APPLICATION AND PROTOCOL :- Multimedia over IP: RTP, RTCP. Streaming media, Codec and Plugins, VoIP, Text and Voice Chat. Multimedia Communication across networks - packet audio / video, Streaming video across internet.	10
4	UNIT IV- ARCHITECTURAL AND TELECOMMUNICATION CONSIDERATIONS :- Specialized computational processors, memory systems, Multimedia board solutions, LAN/WAN Connectivity, Multimedia transport across ATM networks, Wireless Networks.	8
5	UNIT V -MULTIMEDIA APPLICATION DESIGN (NITT) :- Multimedia Application Classes – Types of Multimedia Systems – Virtual Reality – Components of Multimedia Systems -Multimedia Authoring Systems – Multimedia Authoring Tools - User Interface Design- Mobile Messaging – Hypermedia Message Components - Hypermedia Linking and embedding.	8

Outcome

1. Technical know to develop new compression standards
2. Acquire skill set to handle all multimedia components efficiently
3. Develop Integrated and Collaborative multimedia systems

Text Books

1. Prabat K Andleigh and Kiran Thakrar, "Multimedia Systems and Design", Prentice Hall India, 2007,New Delhi.
2. Ralf Steinmetz, Klara Steinmetz, "Multimedia Computing, Communications & Applications", Pearson education, 2009.

References

1. A.K. Jain, Fundamentals of Digital Image Processing ,PHI, New Delhi, 2001.
2. William K Pratt, Digital Image Processing, John Willey , 2012.
3. Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education, 2011.
4. Tay Vaughan, "Multimedia Making It Work", McGraw Hill, 2011.
5. Parekh R "Principles of Multimedia" Tata McGraw-Hill, 2006.

SubTitle:ADVANCED ARTIFICIAL INTELLIGENCE		
SubCode:CSPATP4	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSE OBJECTIVE

1. To Discuss the Problem and Search Techniques in AI
2. To Discuss Knowledge Representation Schemes
3. To Discuss Learning and Fuzzy Logic Systems
4. To Discuss Connectionist Models and Expert System
5. To Discuss PROLOG and LISP Programming Languages

UNIT No	SyllabusContent	Noof Hours

1	**PROBLEMS AND SEARCH** The importance of AI, Early Work in AI, The AI Problems, Defining the Problem as a State Space Search, Production Systems, Control Strategies, Heuristic Search Techniques (Hill Climbing, Best First Search).	8
2	**KNOWLEDGE REPRESENTATION** Approaches to Knowledge Representation, Representing Simple Facts in Logic, Resolution (Conversion to Clause Form, The Unification Algorithm, Resolution Algorithm), Procedural versus Declarative Knowledge, Weak Slot and Filler Structure (Semantic Nets, Frames), Strong Slot and Filler Structures (Scripts).	8
3	**LEARNING AND FUZZY LOGIC SYSTEMS:** What is Learning, Rote Learning, Learning by Taking Advice, Explanation-Based Learning, Formal Learning Theory, Crisp Sets, Fuzzy Sets, Some Fuzzy Terminology.	8
4	**CONNECTIONIST MODELS AND EXPERT SYSTEMS:** Introduction to Hopfield Networks, Learning in Neural Networks, Backpropagation Networks, Applications of Neural Networks, Recurrent Networks, Expert System Architecture, MYCIN, DENDRAL.	8
5	**PROLOG AND LISP** Introduction to PROLOG, Converting English to PROLOG Facts and Rules, Goals, PROLOG Terminology, Variables, Control Structures, Arithmetic Operators, Backtracking, Introduction to LISP, Basic List Manipulation Functions in LISP, Defining Functions, Predicates and Conditionals, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Arrays	8

COURSE OUTCOMES: The Students would have Learnt
CO1: Understanding the basics of Problem Solving in AI
CO2: Understanding the Knowledge Representation Scheme
CO3: Understanding Fuzzy Logic
CO4: Understanding Expert System
CO5: Understanding the Languages PROLOG and LISP

TextBooks:

Artificial Intelligence,E. Rich, K. Knight and S.B. Nair,McGraw Hill Education,3edition.

ReferenceBooks:

Introduction to ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS,D.W. Patterson,PHI.

SubTitle:Specialized Machine Learning		
SubCode:CSPATP5	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours: 21

COURSEOBJECTIVE:

3. Todiscussthefundamentalimportance ofMachine learning techniques
4. Todiscussthevarious ML algorithmsapplication.
5. Todiscusstransfer learning techniques for special domain datasets.
6. Todiscussand applications of ML techniques in the various domains

UNIT No	SyllabusContent	Noof Hours
1	**Unit 1: Foundations for ML:** ML Techniques overview, Validation Techniques (Cross-Validations), Feature Reduction/Dimensionality reduction, Principal components analysis (Eigen values, Eigen vectors, Orthogonality), supervised, unsupervised learning	8
2	**Unit 2: Clustering:** Distance measures, Different clustering methods (Distance, Density, Hierarchical), Decision-trees, Iterative distance-based clustering; Dealing with continuous, categorical values in K-Means , Constructing a hierarchical cluster , K-Medoids, k-Mode, Measures of quality of clustering	10
3	**Unit 3: Classification:** Naïve Bayes Classifier, Model Assumptions, Probability estimation, Required data processing, M-estimates, Feature selection: Mutual information, Classifier K-Nearest Neighbours, Support Vector Machines , Linear learning machines and Kernel space, Making Kernels and working in feature space , SVM for classification and regression problems over fitting and module evaluation parameters.	10
4	**Unit 4 Specialized AI models:** Image classification and hyper-parameter tuning, Emerging NN architectures Recurrent Neural Networks (RNN) Building recurrent NN, Long Short-Term Memory (LSTM), Time Series Forecasting, Deep Learning [, Auto-encoders and unsupervised learning, auto-encoders, Regularization - Dropout and Batch normalization	8

5	**Unit 5 ML applications in special domains:** Transfer learning concepts, applications of ML in the domain healthcare, security, text classification, image classifications, credit card fraud detection, smoke detection etc.	8

COURSEOUTCOMES: Thestudentswouldhavelearnt

CO1: UnderstandingofbasicMLtechniques.
CO2: Understanding of ML for Imageanalysis
CO3: Understanding various special CNN models
CO4: Building some ML models in some special domains like healthcare, security etc.

TextBooks:
Text/References:

1. Introduction to Machine learning, Nils J. Nilsson

2. Machine learning for dummies, IBM Limited ed, by Judith Hurwitz and Daniel Kirsch

3. Introduction to Machine Learning with Python A guide for data scientists, Andreas, C. Muller & Sarah Guido, O'Reilly

SubTitle:SOFT COMPUTING		
SubCode:CSPATP6	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSEOBJECTIVE:

1. To Discuss Introduction of Soft Computing
2. To Discuss First Generation ANN.
3. To Discuss Second Generation ANN.
4. To Discuss Fuzzy Logic
5. To Discuss Genetic Algorithm and Swarm Intelligent Systems

UNIT No	SyllabusContent	Noof Hours
1	**INTRODUCTION TO SOFT COMPUTING** Hard Computing vs Soft Computing, Development of AI, Development of intelligent systems, Artificial Neural Networks (Developments of ANNs, Strengths and Weaknesses of ANNs, Neural Computing vs Conventional Computing), Fuzzy Systems, Genetic Algorithm and Evolutionary Programming.	8
2	**ARTIFICIAL NEURAL NETWORKS-FIRST GENERATION** Introduction to Neural Networks, Biological Inspiration (Comparison between Brain and Computer), Biological Neural Networks to Artificial Neural Networks(Information Processing at the Neurons and Synapses), Classification of ANNs (Neural Network Architecture, Multilayer-Neural Network, Competitive Neural Network, Learning/Training), First-Generation Neural Networks (McCulloch and Pitts Neuron Model, Learning Rules:Hebbian and Delta), Percepron Network, ADALINE Network, MADALINE Network.	8
3	**ARTIFICIAL NEURAL NETWORKS – SECOND GENERATION:** Introduction to Second-Generation Neural Networks, Backpropagation Neural Networks, Backpropagation Training for Multilayer Neural Network (Calculation of Weights for Output Neurons, Calculation of Weights for Hidden-Layer Neurons, Factors influencing Backpropagation Training, Character Recognition using Backpropagation Neural Network), Kohonen Neural Network.	8
4	**FUZZY LOGIC:** Introduction to Fuzzy Logic, Human Learning Ability, Imprecision and Uncertainty, Undecidability, Probability Theory vs Possibility Theory, Classical Sets and Fuzzy Sets, Representation of a Classical Set, Representation of a Fuzzy Set	8

5	**GENETIC ALGORITHMS AND SWARM INTELLIGENT SYSTEMS** Introduction to Genetic Algorithms, Genetic Algorithms, Procedures of GAs, Introduction to Swarm Intelligence, Background of Swarm Intelligent Systems, Ant Colony System, Particle Swarm Intelligent Systems	8

COURSEOUTCOMES: Thestudentswouldhavelearnt :
CO1:Understanding basics of Soft Computing.
CO2:Understanding First Generation ANN
CO3:Understanding Second Generation ANN
CO4:Understanding Fuzzy Logic.
CO5:Understanding Genetic Algorithm and Swarm Intelligent Systems

TextBooks:

1. **Soft Computing**, NP Padhy and SP Simon, Oxford Higher Education..

ReferenceBooks:

4. **Neural Networks and Fuzzy Systems**, Bart Kosko,PHI.

SubTitle:Cluster and Grid Computing Specialized		
SubCode:CSPATP7	No.ofCredits: 3=3:0:0 (L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSEOBJECTIVE:

1. To know the Basics for Cluster and Grid Computing
2. To understand any kind of heterogeneous resources over a network using open standards
3. To learn the Scheduling of Grid Computing.
4. To know about the Applications of Grid
5. To know about the grid architecture

UNIT No	SyllabusContent	Noof Hours
1	**Cluster Computing** Basic concept of distributed and parallel computing, shared memory, Scheduling Concept, Cluster Computing-Introduction, Architecture of Cluster Computing, Functionality of Cluster, Categories of Clusters.	10
2	**Grid Computing** Grid Computing: History of grid computing, Basic concept, benefits of grid computing,Clustering and Grid Computing: Conventional Service Model, Central Grid Approach and Distributed Grid Computing Environment. cluster Vs Grid. Grid Architecture, Grid Applications, Grid Components. .	10
3	**Scheduling** High performance Grid, HPC Grids; Grid scheduler and a local resource scheduler, Load Balancing, Grid Scheduling: Job Scheduling, Resource Scheduling, Various factors of Scheduling, Scheduling Procedure. Challenges in Grid Scheduling.	08
4	**Implementation: Grid Simulation tool kit** Grid Sim Tool kit —Overview, OGSA based Grids, Installation of Pre-requisites and Necessary Component, Installation of GridSim Toolkit, Salient Feature of GridSim.	10

5	Application integration- Application classification – SPSD , SPMD, MIMD, MPSD, Granularity, Grid requirements- Job Scheduling, Data Management, Security,Managing Grids– Different application areas of Grid computing.	10

COURSEOUTCOMES: Thestudentswouldhavelearnt

1. Be able to know about Grid Computing Basics
2. Be able to utilise grid computing, its application
3. able to Simulate Grid with Simulation Kit
4. Able to know the Structure of Grid Computing.

Text Books

1. Ahmar Abbas, "Grid Computing, A Practical Guide to Technology and Applications", Firewall Media.
2. Joshy Joseph and Craig Fellenstein, "Grid Computing", Pearson Education.
3. Fran Berman, Geoffrey Fox and Anthony J. G. Hey, "Grid Computing: Making the Global Infrastructure a Reality", Willy Publisher.

Reference Books

1. Grid and Cluster Computing by C.S.R. Prabhu, PHI.
2. Ian Foster and Carl Kesselman, "Grid Blue Print for New Computing Infrastructure", Morgan Kaufmann.

SubTitle:High Performance Network		
SubCode:CSPATP8	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSEOBJECTIVE:

1. Demonstrate basics of networks with high speed network.
2. Demonstrate the traffic modeling of Network.
3. Demonstrate Networks Security issues and their solution.
4. Demonstrate the various high performance networking technologies.

UNIT No	SyllabusContent	Noof Hour
1	UNIT- I **INTRODUCTION** Review of OSI, TCP/IP, Multiplexing, Modes of Communication, Switching, Routing. SONET – DWDM – DSL – ISDN – BISDN, ATM.	10
2	UNIT- II **MULTIMEDIA NETWORKING APPLICATIONS** Streaming stored Audio and Video – Best effort service – protocols for real time interactive applications – Beyond best effort – scheduling and policing mechanism – integrated services – RSVP- differentiated services.	10
3	UNIT- III **ADVANCED NETWORKS CONCEPTS** VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN. MPLS -operation, Routing, Tunneling and use of FEC, Traffic Engineering, MPLS based VPN, overlay networks-P2P connections, IPv6. **TRAFFIC MODELLING** Little's theorem, Need for modelling, Poisson modelling and its failure, Non - poisson models, Network performance evaluation.	12
4	UNIT IV **NETWORK SECURITY & MANAGEMENT** Infrastructure for network management – The internet standard management framework – SMI, MIB, SNMP, Security and administration. Principles of cryptography – Authentication – integrity – key distribution and certification – Access control and: fire walls – attacks and counter measures – security in many layers.	10
5	UNIT-IV **SPECIAL NETWORKS** Vehicular Ad-hoc Network (VANET), Wireless Body Area Network (WBAN), Under Water Sensor Network, Latest high performance networking technologies.	10

COURSEOUTCOMES: Thestudentswouldhavelearnt

CO1: Understand the fundamentals of Network.
CO2: Understand the advanced networking concepts like VPN, Tunneling, MPLS etc.
CO3: Understand the concept of Security and Management of Network..
CO4: Understand latest High Performance Networking technologies.
CO-5 Analyse the different problems of latest technologies.

Text Books:

1. J.F. Kurose & K.W. Ross,"Computer Networking- A top down approach featuring the internet", Pearson.
2. Walrand J. Varatya, High performance communication network, Morgan Kauffman – Harcourt Asia Pvt. Ltd.

Reference Books:

1. Anurag kumar, D. MAnjunath, Joy kuri, "Communication Networking", Morgan Kaufmann Publishers.
2. HersentGurle& petit, "IP Telephony, packet Pored Multimedia communication Systems", Pearson education.
3. LEOM-GarCIA, WIDJAJA, "Communication networks", TMH.
4. Fred Halsall and Lingana Gouda Kulkarni,"Computer Networking and the Internet" fifth edition, Pearson education.

SubTitle:Ad-Hoc And Wireless Sensor Networks		
SubCode:CSPATP9	No.ofCredits: 3=3:0:0 (L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSEOBJECTIVE:

1. The objectives of this course are to make the student
1. To study the fundamentals of wireless Ad-Hoc Networks.
2. To study the operation and performance of various Ad-hoc wireless network protocols.
3. To study the architecture and protocols of Wireless sensor networks.

UNIT No	SyllabusContent	Noof Hours
1	Wireless LANs and PANs: Introduction, Fundamentals of WLANS, IEEE 802.11 Standards, HIPERLAN Standard, Bluetooth, Home RF. Ad-hoc Wireless Networks: Introduction, Issues in Ad-hoc Wireless Networks.	10
2	MAC Protocols: Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.	10
3	Routing Protocols: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols. '	08
5	Wireless Sensor Networks: Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other Issues.	10
4	Transport Layer Protocols: Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks.	10

COURSEOUTCOMES: On completion of this course student will be able to
1. Understand the basis of Ad-hoc wireless networks.
2. Understand design, operation and the performance of MAC layer protocols of Ad-hoc wireless networks.
3. Understand design, operation and the performance of routing protocol of Ad-hoc wireless network.
4. Understand design, operation and the performance of transport layer protocol of Ad-hoc wireless networks.

Text Books:

1. Introduction to Wireless and Mobile Systems-Dharma Prakash Agrawal, Qing-An Zeng, Cengage Learning
2. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, PHI.
3. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control - Jagannathan Sarangapani, CRC Press.

References:

1. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh , Pearson Education.
2. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, Springer

Sub Title: Advanced Algorithm		
Sub Code: CSPBTT1	No. of Credits:4=3:0:0(L-T-P)	No of lecture hours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSE OBJECTIVE:

1. To making strategy for an adequate algorithm
2. To introduce some optimization technique
3. To introduce technique for making a hard approximation algorithm
4. To introduce some advance analysis for algorithm.
5. To expose students to how develop the different kind of algorithm for newly problem.

UNIT No	Syllabus Content	No of Hours
1	Greedy strategy and algorithm, Dynamic introduction and programming, Recursive algorithm	10
2	Amortized analysis: Aggregate analysis, Potential method, Accounting method, Dynamic tables, Disjoint set, Backtracking technique.	10
3	Graph algorithm: Elementary graph algorithms, Maximum Flow, Single source and all pair shortest paths,	12
4	String matching, Matrix operations, Optimized strategy and algorithm, some parallel sorting algorithm(specify one or two)	10
5	Complexity classes: P, NP, NP-completeness, NP-hardness, Approximation algorithms, Randomization and linear programming.	10

COURSE OUTCOMES:

CO1. Ability to find out adequate algorithm for a problem.
CO2. Able to spontaneous analysis of algorithm
CO3. Basic ability to design a technique and data structure to solve a problem
CO4. Learn different graph based algorithm
CO5. Ability to find the approximation solution for a hard problem.

Text Books:

1. Cormen T, Leiserson C, Rivest R, and Stein C: Introduction to Algorithms, MIT Press, 2009
2. Introduction to parallel algorithm C. Xavier,S.S. Iyengar,New York Willey c1998.
3. Data Structures, Algorithms and Applications in C++ by Sartaj Sahni. University Press.
4. Motwani and Raghavan: Randomized Algorithms. Cambridge University Press, 2004

Reference Books:

1.J. Kleinberg and E. Tardos, Algorithm Design, Pearson International Edition, 2005.
2. An Introduction to Optimization, Edwin KP. Chong& Stanislaw H. Zak, Wiley Publication.

Sub Title: Advanced Algorithm Lab	
Sub Code: CSPALT1	No. of Credits: 2=0:0:2(L-T-P)
Exam Duration:3 hours	IA+ESE =30+20

Lab

Lab OBJECTIVE:

1. To basic implementation of graph algorithm
   To analyze the code optimization strategy.
3. To expose students how to implement parallel algorithm.
4. To analyze the linear programming and maximum flow implementation.
5. Making good strategy towards the algorithm to be become the good researcher.

Unit No.	Content	Teaching Hours
I,II, III, IV and V	• Implement a graph algorithm. • Implement a string matching algorithm • Implement a greedy algorithm • Implement dynamic algorithm • Implement a matrix operation algorithm • Implement maximum flow algorithm • Implement some approximation algorithm • Implement shortest path algorithm • Implement for sparse graph algorithm • Implement some linear programming algorithm • Implement some optimized algorithm • Implement some parallel sorting algorithm	24

LAB OUTCOMES:

CO1: Bring the capabilities to students to be become the good researcher
CO2: To teach hot to make and formulate optimization problem.
CO3: Students spontaneous able to implement the some graph and approximation algorithm.
CO4: Students will able to implement the dynamic type problem.
CO5: To able to develop the mathematical formula and model.

Text Books:

1. Introduction to Algorithm, Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, Clifford Stein, Publisher PHI, ISBN 81-203-2141-3
2. Python Algorithms Mastering Basic Algorithms in the Python Language by Magnus Lie Hetland.
3. Introduction to parallel algorithm C. Xavier,S.S. Iyengar, New York Willey c1998

Reference Books:

1. Introduction to Parallel Computing: From Algorithms to Programming on State-of-the-Art Platforms, Roman
2. Data Structures and Algorithms Using Python Rance D. Necaise.

SubTitle: ADVANCED DIGITAL IMAGE PROCESSING

Sub Code: CSPBTT1	**No.ofCredits:3=3:0:0(L-T-P)**	**No of lecture hours/week:03**
ExamDuration:3hours	**IA+ESE =40+60**	**Totalnoofcontacthours:21**

COURSEOBJECTIVE:

1. Explain the essentials of digital image processing.
2. Describe various segmentation techniques for image analysis.
3. Outline the various feature extraction techniques for image analysis.
4. Discuss the concepts of image registration and fusion.
5. Outline various object recognition techniques.

UNIT No	Syllabus Content	Noof Hours
1	**REVIEW OF DIGITAL IMAGE FUNDAMENTALS** Steps in digital image processing, Digital Imaging system. Digital Image Transform – DFT, DCT etc. Image enhancement in spatial and frequency domain, Histogram equalization.	10
2	**SEGMENTATION** Edge detection, Thresholding-Global thresholding, Adaptive thresholding etc. Region growing- Region growing, Split and merge algorithm etc. Active contour models, Validation of Segmented Algorithms, Colour Image Segmentation, Fuzzy segmentation.	10
3	**IMAGE FEATURE REPRESENTATION** Boundary Representation, Boundary Description- Simple descriptor, Fourier descriptor, Concavity Tree etc. Regional Descriptor – Shape Feature, Topological, Texture , Transform, Syntactic and structural feature. Feature Selection Technique.	10
4	**IMAGE REGISTRATION AND FUSION** Feature matching, Spatial alignment, Resampling- NearestNeighbour and Cubic Splines, Pixel level fusion , Feature level fusion operation , Decisive level fusion operators.	10
5	**OBJECT RECOGNITION** Pattern and Pattern Classes, Template Matching, Classification, Bayesian Classifier, K-NN Classifier, Regression Methods, Clustering Techniques.	10

COURSE OUTCOMES: The students would have learnt
CO1: Fundamentals of Image Processing.
CO2: Various Segmentation technique for Image Analysis.
CO3:Various feature extraction techniques for image analysis.
CO4: Concepts of image registration and fusion.
CO5: Various object recognition techniques.

TextBooks:

2. **Digital Image Processing**- RCGonzalez&REWoods,Pearson Education ,Third edition.
3. **Digital Image Processing** – S.Sridhar, Oxford University Press, 2nd Edition.

Reference Books:

5. **Digital Image Processing**-S.Jayaraman, S.Esakkirajan, T.Veerakumar, Tata Mcgraw Hill.
6. **Fundamentals of Digital Image processing**, AKJain, PHI/PearsonEducation,1989.
7. **Digital Image Processing**, SidAhmed, McGrawHill.

Sub Title: Advanced DIP Lab	
Sub Code: CSPALT2	No. of Credits: 2=0:0:2(L-T-P)
Exam Duration:3 hours	IA+ESE =30+20

UNIT	Practical List	Noof Hours
UNIT I,II, III, IV, V	1. Implementation of Transformation of Images. 2. Implementation of Histogram operations and Contrast stretching and gamma correction on images. 3. Implementation of different Image Detection Techniques. 4. Implementation of Clustering Techniques. 5. Implementation of K-Nearest Neighbour Classifier. 6. Understanding the Extraction of Image features and Specifications. 7. Understanding the colour models and manipulates colour images. 8. Understanding Image Segmentation using different Thresholding techniques. 9. Implementation of Regression methods. 10. Understanding the visual effects such as fusion and blending.	24

COURSE OUTCOMES: The students would have learnt about:

1. Implementation of Transformation, Image detection and clustering techniques.
2. Extraction of features and specification.
3. Understand about the color models, Image Segmentation.
4. Implementation of Regression methods.

Reference Books:

TextBooks:

1. **Digital Image Processing**- RCGonzalez&REWoods,Pearson Education ,Third edition.
2. **Digital Image Processing** – S.Sridhar, Oxford University Press, 2nd Edition.

Reference Books:

1. **Digital Image Processing**-S.Jayaraman, S.Esakkirajan, T.Veerakumar, Tata Mcgraw Hill.
2. **Fundamentals of Digital Image processing**, AKJain, PHI/PearsonEducation,1989.
3. **Digital Image Processing**, SidAhmed, McGrawHill.

SubTitle:DATA SCIENCE		
SubCode:CSPBTP1	No.ofCredits: 3=3:0:0 (L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSEOBJECTIVE:

1. Provideyou withtheknowledgeand expertisetobecomea proficientdatascientist.
2. Demonstratean understanding of statisticsandmachinelearning conceptsthatarevitalfordata science;
3. ProducePython codeto statisticallyanalysesadataset;
4. Criticallyevaluatedatavisualizationsbased ontheir design anduseforcommunicating storiesfrom data;

UNIT No	SyllabusContent	Noof Hours
1	**Unit 1:** Introduction tocoreconceptsand technologies: Introduction,Terminology,datascienceprocess,data sciencetoolkit,Typesof data,Exampleapplications.	10
2	**Unit 2:** Datacollection andmanagement:Introduction,Sources ofdata,DatacollectionandAPIs, Exploring andfixing data,Datastorageandmanagement,Usingmultipledatasources.	10
3	**Unit 3:** Data analysis:Introduction,Terminologyand concepts,Introduction tostatistics,Centraltendenciesanddistributions,Variance,Distributionpropertiesa nd arithmetic,Samples/CLT,Basicmachinelearning algorithms,Linearregression,SVM,NaiveBayes.	08
4	**Unit 4:** Datavisualization:Introduction,Typesofdata visualization,Dataforvisualization:Datatypes,Dataencodings,Retinalvariables,Mappingv ariables toencodings,Visualencodings.	10
5	ApplicationsofData Science,Technologiesfor visualization,Bokeh(Python), Recenttrends invariousdatacollection andanalysistechniques,variousvisualizationtechniques,applicationdevelopmentmethodsof usedin datascience.	

COURSEOUTCOMES: Oncompletion of the course the studentshould be able to

1. Explain howdata iscollected, managed andstored fordatascience;
2. Understand thekeyconceptsin datascience,including theirreal-worldapplications andthetoolkit usedbydatascientists;
3. Implement datacollectionand managementscriptsusing MongoDB

References:

1. CathyO'Neiland RachelSchutt.DoingDataScience,StraightTalkfromtheFrontline.O'Reilly.
2. JureLeskovek,AnnandRajaramanandJeffreyUllman.Mining ofMassiveDatasets.v2.1,CambridgeUniversityPress.

SubTitle:SOFTWARE PROCESS AND PROJECT MANAGEMENT		
SubCode: CSPBTP2	No.ofCredits: 3=3:0:0 (L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSEOBJECTIVE:

1. Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
2. Compare and differentiate organization structures and project structures.
3. Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.
4. To understand the future software project management practices
5. To learn the different process models
6. To understand workflows, check points of process

UNIT No	SyllabusContent	Noof Hours
1	Software Process Maturity: Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The ptimizing Process. Process Reference Models: Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP.	10
2	Software Project Management Renaissance: Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way. Life-Cycle Phases and Process artifacts: Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures.	10
3	Workflows and Checkpoints of process: Software process workflows, Iteration workflows, Major milestones, Minor milestones, Periodic status assessments. Process Planning: Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.	08
4	Project Organizations: Line-of- business organizations, project organizations, evolution of organizations, process automation. Project Control and process instrumentation: The seven-core metrics, management indicators, quality indicators, life-cycle expectations. Pragmatic Software metrics and metrics automation.	10

5	CCPDS-R Case Study and Future Software Project Management Practices Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.	10

COURSEOUTCOMES: The student will be able to

1. Appreciate the importance of software process and management;
2. Apply project management techniques for information systems development;
3. Apply the management skills to monitor and control a software project;
4. Work together as a team in preparing a report
animation, e-research;
4. Describe the hardware and software concepts and architecture of cloud computing.

TEXT BOOKS:

1. Watts S.Humphrey,"Managing the Software Process" , Pearson Education.[ISBN-13:978- 0201180954]
2. Walker Royce"Software Project Management", Pearson Education. [ISBN: 9788177583786]

REFERENCE BOOKS:

1. Agile, Extreme, Robert Wysocki, "Effective Project Management: Traditional", Sixth edition, Wiley India, rp2011.[ISBN:978-1-118-01619-0]
2. Bob Hughes & Mike Cotterell ,"Software Project Management", fourth edition, TMH, 2006

SubTitle:GPU COMPUTING		
SubCode: CSPBTP3	No.ofCredits: 3=3:0:0 (L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSEOBJECTIVE
• Tolearn parallelprogramming with GraphicsProcessing Units(GPUs).

UNIT No	SyllabusContent	Noof Hours
1	**Introduction**:History,Graphics Processors,GraphicsProcessing Units,GPGPUs.Clockspeeds,CPU/GPUcomparisons,Heterogeneity,Accelerators,Parallelprogramming,CUDAOpen CL/ Open ACC, HelloWorldComputationKernels,Launchparameters,Threadhierarchy,Warps/ Wavefronts,Thread blocks / Workgroups,Streamingmultiprocessors, 1D/ 2D/ 3Dthreadmapping,Deviceproperties,SimplePrograms.	10
2	**Unit 2:** **Memory**:Memoryhierarchy,DRAM/global,local/shared,private/local,textures,ConstantMemory,Pointers,ParameterPassing,Arrays anddynamicMemory,Multi-dimensionalArrays,MemoryAllocation,Memorycopying acrossdevices,Programswith matrices,Performanceevaluation withdifferent memories.	10
3	**Unit 3:** **Synchronization**:MemoryConsistency,Barriers(localversus global),Atomics,Memoryfence.Prefixsum,Reduction.ProgramsforconcurentDataStructuressuch asWorklists,Linked-lists.Synchronization acrossCPU andGPU**Functions**:Devicefunctions,Host functions,Kernelsfunctions, Usinglibraries(such asThrust), anddeveloping libraries.	08
4	**Unit 4:** **Support**:Debugging GPUPrograms.Profiling,Profiletools,Performanceaspects **Streams**:Asynchronousprocessing,tasks,Task-dependence,Overlappeddatatransfers,DefaultStream,Synchronizationwith streams.Events,Event-based-Synchronization -Overlapping datatransferand kernelexecution,pitfalls.	10
5	**Unit 5:** **Case Studies**:ImageProcessing,Graph algorithms,Simulations,DeepLearning. **Advancedtopics**:Dynamicparallelism,Unified VirtualMemory,Multi-GPUprocessing,Peeraccess,Heterogeneousprocessing.	

COURSEOUTCOMES
Aftercompletion ofcourse,studentswould be:
• Studentswould learn conceptsin parallelprogramming,implementationofprogramson GPUs, debugging andprofiling parallelprograms.

References:

1. Programming MassivelyParallelProcessors:A Hands-on Approach;DavidKirk,Wen-meiHwu;MorganKaufman;2010(ISBN:978-0123814722)
2. CUDAProgramming:ADeveloper'sGuideto

ParallelComputingwithGPUs;ShaneCook;MorganKaufman;2012(ISBN:978-0124159334)

SubTitle: DATABASE ENGINEERING		
Sub Code:CSPBTP4	No.ofCredits:3=3:0:0(L-T-P)	No of lecture hours/week:03
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSEOBJECTIVE:

1. To provide students with basic concepts in databases both in terms of usage and implementation
2. To make the students understand all requirement and operations that the analyst needed to analyze, design, and implement the systems

UNIT No	Syllabus Content	Noof Hours
1	. Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models – the ER Model, Relational Model, other Models, Database Languages – DDL, DML, Database Access from Applications Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users and Administrators, ER Diagrams,	10
2	Introduction to the Relational Model – Integrity Constraints Over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views, Altering Tables and Views, Relational Algebra, Basic SQL Queries, Nested Queries, Complex Integrity Constraints in SQL, Triggers.	10
3	Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND, THIRD Normal forms, BCNF, Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design, Multi valued Dependencies, FOURTH Normal Form, Join Dependencies, FIFTH Normal form.	10
4	Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock Based Concurrency Control, Deadlocks, Performance of Locking, Transaction Support in SQL.	10

5	Concurrency Control: Serializability, and recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques, Concurrency Control without Locking. Crash recovery: Introduction to Crash recovery, Introduction to ARIES, the Log, and Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery.	10

COURSE OUTCOMES: The students would have learnt

CO1: • Aware of various database systems and its design issues

CO2: • Design and implement a database for any specified domain according to well-known design principles that balance data retrieval performance with data consistency guarantees

CO3 • Formulate data retrieval queries in SQL and the abstract query languages

REFERENCES:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition, 2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw hill, VI edition, 2006.
3. Fundamentals of Database Systems 5th edition. RamezElmasri, ShamkantB.Navathe, Pearson Education, 2008.
4. Introduction to Database Systems, C.J.Date,Pearson Education.
5. Database Management System Oracle SQL and PL/SQL, P.K.Das Gupta, PHI.
6. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.

SubTitle: Cryptography and Network Security		
Sub Code: CSPBTP5	No.ofCredits:3=3:0:0(L-T-P)	No of lecture hours/week:03

ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSEOBJECTIVE:

The course is designed to train the post graduates in:

1. In depth understanding of network security.
2. In depth understanding of the Cryptographic Techniques.
3. To apply cryptographic techniques in computer systems.
4. To design new or modify existing cryptographic techniques.
5. To work in research institutions / Industry in the field of Security

UNIT No	Syllabus Content	Noof Hours
1	(Introduction to Cryptography and Block Ciphers) Introduction to security attacks - services and mechanism - introduction to cryptography - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and blockciphers - Modern Block Ciphers: Block ciphers principals - Shannon's theory of confusion and diffusion - fiestal structure - data encryption standard(DES) - strength of DES - differential and linearcrypt analysis of DES - block cipher modes of operations - triple DES – AES.	10
2	(Public key cryptography and Authentication requirements) Principles of public key crypto systems - RSA algorithm - security of RSA - key management – Diffle-Hellman key exchange algorithm, Message Authentication and Hash Function: Authentication requirements - authentication functions - message authentication code - hash functions - birthday attacks – security of hash functions and MACS.	10
3	(Integrity checks and Authentication algorithms) MD5 message digest algorithm - Secure hash algorithm (SHA) Digital Signatures: Digital Signatures - authentication protocols - digital signature standards (DSS) - proof of digital signature algorithm - Authentication Applications: Kerberos and X.509 - directory authentication service - electronic mail security-pretty good privacy (PGP) - S/MIME.	10
4	(IP Security and Key Management) IP Security: Architecture - Authentication header - Encapsulating security payloads - combining security associations - key management.	10
5	(Web and System Security) Web Security: Secure socket layer and transport layer security - secure electronic transaction (SET) - System Security: Intruders - Viruses and related threads - firewall design principals – trusted systems.	10

COURSE OUTCOMES: Post Graduates after completing the course shall gain:
1. Ability to understand concepts of network security and cryptographic techniques.
2. Ability to design and analyze cryptographic techniques.
3. Ability to solve network security issues in real time applications.
4. Ability to take up doctoral level research work in security.

Text Books

1. William Stallings, "Crpyptography and Network security Principles and Practices", Pearson/PHI.

2. Wade Trappe, Lawrence C Washington, " Introduction to Cryptography with coding theory", Pearson.

Reference Books

1. W. Mao, "Modern Cryptography – Theory and Practice", Pearson Education.

2. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing – Prentice Hall of India.

Sub Title: Multiprocessor System		
Sub Code: CSPBTP6	No. of Credits:3=3:0:0(L-T-P)	No of lecture hours/week:04
ExamDuration:3hours	IA+ESE =40+60	Totalnoofcontacthours:21

COURSE OBJECTIVE:

1. To study basic multiprocessor system.
2. To expose the students about pipeline processor
3. To learn about parallelism strategy to enhance the speedup
4. Making the data and instruction level parallelism concept
5. To teach about multicore superpower GPU system

UNIT No	Syllabus Content	No of Hours
1	Fundamental of multiprocessor system, Speedup performance law, Amdahl's law, Bus, cache and shared memory organizations, latency time and efficiency. PRAM model	10
2	Pipeline architecture, problem to make pipeline hard, Hazard, dependencies, Instruction level parallelism, static scheduling and dynamic scheduling,	10
3	Data level parallelism, vectorization and pipeline vector processing, hardware and software parallelism concept. Synchronous and Asynchronous message passing , Loop parallelism	12
4	Multiprocessor programming, multithreading programming concept, multithreading issues and solutions, Threads inside the Hardware, What happens when a thread increased and decreased inside the hardware and program, message passing program development,	10
5	Overview of parallel languages, GPU, programming on multiple cores CPU and GPU, speedup comparisons, Architecture of GPU, SIMD array processor, Multicomputer system and distributed system.	10

Subject:	Business Analytics (MSPBTO1)	Credits			
Type:	Open Elective	L	T	P	Total
Teaching Scheme:	Lectures: 3 hours/week	3	0	0	3
Course outcomes:	At the end of the course, students will be able to				
1	Students will demonstrate knowledge of data analytics				
2	Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.				
3	Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.				
4	Students will demonstrate the ability to translate data into clear, actionable insights.				

Syllabus Contents:

- Unit1: Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.
- Unit 2: Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.
- Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.
- Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.
- Unit 5: Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, the Value of Information, Utility and Decision Making.
- Unit 6: Recent Trends in Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

References:

- Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
- Business Analytics by James Evans, persons Education..

Subject:	Industrial Safety (IPPBTO2)	Credits			
Type:	Open Elective	L	T	P	Total

Teaching Scheme:	Lectures: 3 hours/week	3	0	0	3

Course outcomes: **At the end of the course, students will be able to**

1	Apply the knowledge of Safety Measures
2	Plan for Engineering maintenance.
3	Determine the wear & Corrosion and apply methods for their prevention.
4	Trace the Fault of machine tools and equipment
5	Plan and implement the periodic and preventive maintenance for machines/equipment.

Syllabus Contents:

- Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.
- Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.
- Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.
- Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.
- Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

References:

- Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
- Maintenance Engineering, H. P. Garg, S. Chand and Company.
- Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
- Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

Subject:	Operations Research (IPPBTO3)	Credits			
Type:	Open Elective	L	T	P	Total
Teaching Scheme:	Lectures: 3 hours/week	3	0	0	3
Course outcomes:	At the end of the course, students will be able to				

1	Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.
2	Students should able to apply the concept of non-linear programming
3	Students should able to carry out sensitivity analysis
4	Student should able to model the real world problem and simulate it.

Syllabus Contents:

- Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models
- Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming
- Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT
- Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.
- Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:

- H.A. Taha, Operations Research, An Introduction, PHI, 2008
- H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
- J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
- Hitler Libermann Operations Research: McGraw Hill Pub. 2009
- Pannerselvam, Operations Research: Prentice Hall of India 2010
- Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

Subject:	Cost Management of Engineering Projects (CEPBTO4)	Credits			
Type:	Open Elective	L	T	P	Total
Teaching Scheme:	Lectures: 3 hours/week	3	0	0	3
Course outcomes:	At the end of the course, students will be able to				
1	Discuss the cost concepts in the cost management process.				
2	Able to handle the projects by the application of project cost control methods.				
3	Determine all types of costing and carryout the analysis of pricings for profitability.				
4	Application of PERT/CPM for cost management.				

Syllabus Contents:

- Introduction and Overview of the Strategic Cost Management Process
- Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.
- Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non-technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process
- Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.
- Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

References:

- Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
- Charles T. Horngren and George Foster, Advanced Management Accounting
- Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
- Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
- N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

Subject:	Composite Materials (MEPBTO5)	Credits			
Type:	Open Elective	L	T	P	Total
Teaching Scheme:	Lectures: 3 hours/week	3	0	0	3
Course outcomes:	At the end of the course, students will be able to				
1	Explain and also implement the composite materials for the required performance based on the characteristics.				
2	Adopt the composite materials as reinforcements.				
3	Implement the methods of manufacturing of metal matrix composites				
4	Adopt the methods of manufacturing of polymer matrix composites				
5	Evaluate the strength of laminates.				

Syllabus Contents:

- INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.
- REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.
- Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.
- Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.
- Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations

References:

- Material Science and Technology – Vol 13 – Composites by R. W. Cahn – VCH, West Germany.
- Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R.
- Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.
- Hand Book of Composite Materials-ed-Lubin.
- Composite Materials – K.K.Chawla.
- Composite Materials Science and Applications – Deborah D.L. Chung.
- Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

Subject:	Waste to Energy (CHPBTO6)	Credits			
Type:	Open Elective	L	T	P	Total
Teaching Scheme:	Lectures: 3 hours/week	3	0	0	3
Course outcomes:	At the end of the course, students will be able to				
1	Classify the waste for fuel and identify the devices for conversion of waste to energy.				
2	Implement the Biomass Pyrolysis				
3	Evaluate the methods of Biomass Gasification and implement their applications.				
4	To design, construct and operation the Biomass Combustion devices.				
5	Classify biomass, apply the bio energy systems design and construction.				

Syllabus Contents:

- Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors
- Biomass Pyrolysis: Pyrolysis – Types, slow, fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.
- Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.
- Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.
- Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

References:

- Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
- Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
- Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
- Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

Subject:	Internet of Things (IoT) (ECPBTO7)	Credits			
Type:	Open Elective	L	T	P	Total
Teaching Scheme:	Lectures: 3 hours/week	3	0	0	3
Course outcomes:	At the end of the course, students will be able to				
1	Understand the concepts of Internet of Things.				
2	Analyze basic protocols in wireless sensor network.				
3	Design IoT applications in different domain and be able to analyze their performance				
4	Elaborate the need for Data Analytics and Security in IoT.				
5	Understand the concepts of Internet of Things.				

Syllabus Contents:

Review of computer communication concepts (OSI layers, components, packet communication, Networks, TCP-IP, subnetting, IPV4 addressing and challenges). IPV6 addressing. IoT architecture reference layer. Characteristics IoT sensor nodes, Edge computer, cloud and peripheral cloud, single board computers, open source hardware, Examples of IoT infrastructure.

IoT and M2M

Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

IOT protocols and Communication Technologies

MQTT, UDP, MQTT brokers, publish subscribe modes, HTTP, COAP,XMPP and gateway protocols, IoT Communication Pattern, IoT Protocol Architecture, Selection of Wireless technologies (6LoWPAN, Zigbee, WIFI, BT, BLE,SIG,NFC, LORA, Lifi, Widi).

Data and Analytics for IoT

An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of IOT Security, Common Challenges in IOT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment.

IoT Physical Devices and Endpoints: Introduction to Arduino and Raspberry Pi-Installation, Interfaces (serial, SPI, I2C), Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins.

IoT Physical Servers and Cloud Offerings: Introduction to Cloud Storage models and communication APIs WebServer: Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API.

IoT application and its Variants: Case studies: IoT for smart cities, smart grid, health care, agriculture, smart meters.M2M, Web of things, Cellular IoT, Industrial IoT, Industry 4.0,IoT standards.

•

References:

- "Internet of Things - A Hands-on Approach", ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
- "Internet of Things", Srinivasa K G, CENGAGE Leaning India, 2017.
- " IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry1stEdition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978-9386873743)
- "Getting Started with Raspberry Pi", Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759.
- "From Machine to Machine to Internet of Things", Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle, Elsevier Publications, 2014.

AUDIT 1 and 2: ENGLISH FOR RESEARCH PAPER WRITING

Course objectives:

Students will be able to:

1. Understandthathowtoimproveyourwritingskillsandlevelofreadability
2. Learn about what to write in eachsection
3. Understand the skills needed when writing a Title

Ensurethegoodqualityofpaperatveryfirst-timesubmission

Syllabus

Units	CONTENTS	Hours
1	PlanningandPreparation,WordOrder,Breakinguplongsentences, Structuring Paragraphs and Sentences, Being Concise andRemoving Redundancy, Avoiding Ambiguity and Vagueness	4
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising,ParaphrasingandPlagiarism,SectionsofaPaper,Abstracts. Introduction	4
3	ReviewoftheLiterature,Methods,Results,Discussion,Conclusions,The Final Check.	4
4	key skills are needed when writing a Title, key skills are needed when writinganAbstract,keyskillsareneededwhenwritinganIntroduction, skills needed when writing a Review of the Literature,	4
5	skillsareneededwhenwritingtheMethods,skillsneededwhenwriting the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions	4
6	useful phrases, how to ensure paper is as good as it could possibly be the first- time submission	4

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on GoogleBooks)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge UniversityPress
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London,2011

AUDIT 1 and 2: STRESS MANAGEMENT BY YOGA

Course Objectives

1. Toachieveoverallhealthofbodyandmind
2. To overcomestress

Syllabus

Unit	*Content*	*Hours*
1	• DefinitionsofEightpartsofyog.(Ashtanga)	8
2	• Yam and Niyam. Do`sandDon't'sinlife. i) Ahinsa, satya, astheya, bramhacharya andaparigraha ii) Shaucha, santosh, tapa, swadhyay,ishwarpranidhan	8
3	• Asan andPranayam i) Variousyogposesandtheirbenefitsformind&body ii)Regularizationofbreathingtechniquesanditseffects-Types ofpranayama	8

Suggested reading

1. 'YogicAsanasforGroupTarining-Part-I":JanardanSwamiYogabhyasiMandal,Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department),Kolkata

Course Outcomes:

Students will be able to:

1. Develophealthymindinahealthybodythusimprovingsocialhealthalso
2. Improveefficiency

AUDIT 1 and 2: DISASTER MANAGEMENT

Course Objectives: -Students will be able to:

1. learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarianresponse.
2. critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflictsituations.
4. critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home countryor the countries they work in

Syllabus

Units	CONTENTS	Hours
1	**Introduction** Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	4
2	**Repercussions Of Disasters And Hazards:** Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts AndFamines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	4
3	**Disaster Prone Areas In India** Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics	4
4	**Disaster Preparedness And Management** Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.	4
5	**Risk Assessment** Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.	4
6	**Disaster Mitigation** Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	4

SUGGESTED READINGS:

1. R.Nishith,SinghAK,"DisasterManagementinIndia:Perspectives,issuesandstrategies""New Royal bookCompany.
2. Sahni, Pardeep Et.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, NewDelhi.
3. Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., NewDelhi.

AUDIT 1 and 2: CONSTITUTION OF INDIA

Course Objectives:

Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indiannationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the IndianConstitution.

Syllabus

Units	Content	Hours
1	• **History of Making of the Indian Constitution:** History Drafting Committee, (Composition & Working)	4
2	• **Philosophy of the Indian Constitution:** Preamble Salient Features	4
3	• **Contours of Constitutional Rights &Duties:** • FundamentalRights • Right toEquality • Right toFreedom • Right againstExploitation • Right to Freedom ofReligion • Cultural and EducationalRights • Right to ConstitutionalRemedies • Directive Principles of StatePolicy • FundamentalDuties.	4
4	• **Organs ofGovernance:** • Parliament • Composition • Qualifications andDisqualifications • Powers andFunctions • Executive • President • Governor • Council ofMinisters • Judiciary, Appointment and Transfer of Judges,Qualifications • Powers andFunctions	4
5	• **LocalAdministration:** • District's Administration head: Role andImportance, • Municipalities: Introduction, Mayor and role of Elected Representative CEO of MunicipalCorporation. • Pachayati raj: Introduction, PRI: ZilaPachayat. • Elected officials and their roles, CEO Zila Pachayat: Position androle. • Block level: Organizational Hierarchy (Different departments), • Village level: Role of Elected and Appointedofficials, • Importance of grass rootdemocracy	4
6	• **ElectionCommission:** • Election Commission: Role andFunctioning.	4

	• Chief Election Commissioner and ElectionCommissioners. • State Election Commission: Role andFunctioning. • Institute and Bodies for the welfare of SC/ST/OBC andwomen.	

Suggested reading

1. TheConstitutionofIndia,1950(BareAct),GovernmentPublication.
2. Dr.S.N.Busi,Dr.B.R.AmbedkarframingofIndianConstitution,1stEdition,2015.
3. M.P.Jain,IndianConstitutionLaw,7thEdn.,LexisNexis,2014.
4. D.D.Basu,IntroductiontotheConstitutionofIndia,LexisNexis,2015.

Course Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indianpolitics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualizationofsocialreformsleadingtorevolutioninIndia.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct electionsthroughadultsuffrageintheIndianConstitution.
4. DiscussthepassageoftheHinduCodeBillof1956.

Semester: - III

S.No	Course Code	SUBJECT	Internal Assessment	Credits
1.	CSPCLT1	Seminar on Dissertation	100	4
2.	CSPCLT2	Dissertation- Interim Evaluation	100	10
		Total	**200**	**14**

Total Credits = 14 Total Marks=200

Semester: - IV

S.No.	Course Code	SUBJECT	Internal Assessment	ESE (External)	Credits
1.	CSPDLT1	Dissertation- Open Defence	100	----	6
2.	CSPDLT2	Dissertation- Evaluation*	100	100	10
		Total	**200**	**100**	**16**

Total Credits = 16 Total Marks=200

Pre-PhD COURSE WORK
RESEARCH METHODOLOGY IN ENGINEERING

Unit 1: PHILOSOPHY AND ETHICS

Introduction to philosophy: nature and scope, concept, branches. Ethics: Definition, moral philosophy, nature of moral judgments and reactions.
Ethics with respect to science and research. Intellectual honesty and research integrity. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP).Redundant publication duplicate and overlapping publications, salami slicing. Selective reporting and misrepresentation of data.

Unit 2: ERRORS IN MEASUREMENTS

Types of Errors, Mean Deviation, Standard Deviation and Probable Errors, Propagation of Errors with Summation, Difference, Product and Quotient.
Curve fitting. Method of least square fit, least square fit (straight line) to linear equations and equation reducible to linear equations. Least square fit (parabola) to quadratic equations and equations reducible to quadratic equations.

Unit 3: DATA PROCESSING & ANALYSIS

Literature Survey, Defining the equation and formulating hypothesis/hypotheses. Collection of research data, tabulating and cataloging, Sampling and methods of data analysis. Laboratory Safety Measures, Maintenance of equipment's and proper storage and disposal of materials.

Unit 4: SCIENTIFIC PRESENTATION AND WRITING SKILLS

Survey of literature and presentation of data, one seminar paper-preparation in PowerPoint (which include texts, graphs, pictures, tables, references etc.)-Oral in PowerPoint/poster, development of communication skills in presentation of scientific seminars- eye to eye contact, facing the audience, question & answer sessions etc.
Steps to better writing, flow method, organization of material and style, drawing figures, graphs, tables, footnotes, references etc in research paper.

Unit 5: PUBLICATION ETHICS.

1. Publication ethics: definition, introduction and importance.2. Best practice/standards setting initiatives and guidelines: COPE, WAME, etc. 3. Conflicts of interests 4. Publications misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types 5. Violation of publication ethics, authorship and contributorship ship 6. Identification of publication misconduct complaints and appeals 7. Predatory publishers and journals.

References:

1. D B Resnik, The Ethics of Science: An Introduction, Routledge Publisher, USA (1998).
2. Callahand D & Bok S. Ethics Teaching in Higher Education, Plenum Press, New York, USA (1996).
3. Kanpur J N. Ethical values for excellence in Education and Science, Vishwa Prakashan, New Delhi (1996).
4. A. N Tripathi. Human Values. New Age International Publication, New Delhi (2008).
5. A Wilson: Handbook of Science Communication, Institute of Physics publishing, Bristol Philadelphia (1998).
6. Science Communication: Theory and practice; Stocklmayer, Gore MM, Bryant C (Eds), Springer (2002).
7. Laszios P., Communicating Science: A Practical Guide, Springer (2006).
8. C R Kothari, Research Methodology: Methods and Technology, 2nd revised edition, New Age International Publication 2004.
9. K. N. Krishnaswamy, A I Sivakumar, M Mathiranjan, Management Research Methodology: Integration Principles, Methods and Techniques, Pearson Education, New Delhi 2006.
10. C K Sharma, M K Jain; Research Methodology, Shree Publications, New Delhi.

NETWORK SECURITY

UNIT - 1 : INTRODUCTION

OSI Security Architecture - Classical Encryption techniques - Cipher Principles - Data Encryption Standard Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES - AES Cipher - Triple DES - Placement of Encryption Function - Traffic Confidentiality

UNIT - 2 : PUBLIC KEY CRYPTOGRAPHY

Key Management - Diffie-Hellman key Exchange - Elliptic Curve Architecture and Cryptography - Public Key Cryptography and RSA. key management, Distribution of public keys, public-key distribution of Secret keys, Diffie- Hellman key Exchange,

UNIT - 3 : AUTHENTICATION AND HASH FUNCTION

Authentication requirements - Authentication functions - Message Authentication Codes - Hash Functions Security of Hash Functions and MACs - MD5 message Digest algorithm - Secure Hash Algorithm RIPEMD - HMAC Digital Signatures - Authentication Protocols - Digital Signature Standard

UNIT - 4 : NETWORK SECURITY

Authentication Applications: Kerberos - X.509 Authentication Service - Electronic Mail Security - PGP S/MIME - IP Security - web Security.

UNIT - 5 : SYSTEM LEVEL SECURITY

Intrusion detection - password management - Viruses and related Threats - Virus Counter measures Firewall Design Principles - Trusted Systems.

TEXT BOOKS

1. William Stallings, "Cryptography And Network Security - Principles and Practices", Prentice Hall of India, Third Edition, 2003.

REFERENCES

1. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
2. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003.

SIMULATIONS & MODELING

UNIT- 1

Introduction to Simulation: Discrete and Continuous Systems, Model of a System, Types of Models, Discrete-Event System Simulation, Steps in a Simulation Study.

System Studies: Subsystems, A Corporate Model, Environment Segment, Production Segment, Management Segment, The Full Corporate Model, Types of System Study, System Analysis, System Design, System Postulation.

UNIT- 2

System Simulation: The Technique of Simulation, The Monte Carlo Method, Comparison of Simulation and Analytical Methods, Experimental Nature of Simulation, Types of System Simulation, Numerical Computation Technique for Continuous Models, Distributed Lag Models, Cobweb Models.

System Dynamics: Exponential Growth Models, Exponential Decay Models, Modified Exponential Growth Models, Logistic Curves, System Dynamics Diagrams, Simple System Dynamics Diagrams, Multi-Segment Models, Representation of Time Delays.

UNIT- 3

Probability Concepts in Simulation: Stochastic Variables, Discrete Probability Functions, Continuous Probability Functions, Measures of Probability Functions, Numerical Evaluation of Continuous Probability Functions, Continuous Uniformly Distributed Random Numbers, Computer Generation of Random Numbers, A Uniform Random Number Generator, Generating Discrete Distributions, Non-Uniform Continuously Distributed Random Numbers, The Rejection Method.

UNIT- 4

Arrival Patterns and Service Times: Congestion in Systems, Arrival Patterns, Poisson Arrival Patterns, The Exponential Distribution, The Coefficient of Variation, The Erlang Distribution, The Hyper-Exponential Distribution, Service Times, The Normal Distribution, Queuing Disciplines, Queuing notation, Measures of Queues, Mathematical Solutions of Queuing Problems.

UNIT- 5

Discrete System Simulation: Discrete Events, Representation of Time, Generation of Arrival Patterns, Simulation of a Telephone System, Delayed Calls, Simulation Programming Tasks, Gathering Statistics, Counters and Summary Statistics, Measuring Utilization and Occupancy, Recording Distributions and Transit Times, Discrete Simulation Languages.

Input Modeling: Data Collection, Identifying the Distribution with Data, Parameter Estimation, Selecting Input Models without Data.

Simulation Software: Simulation in C++, Simulation in GPSS.

Reference:

1. **System Simulation** By Geoffery Godon Second Edition, PHI.
Chapter 2: System Studies, Chapter 3: System Simulation, Chapter 5: System Dynamics,

Chapter 6: Probability Concepts in Simulation , Chapter 7: Arrival Patterns and Service Times,

Chapter 8: Discrete System Simulation, Chapter 9: Introduction to GPSS.

2. **Discrete-event System Simulation** by Jery Banks, John S. Carson, Eastern Economy Edition PHI. Chapter 1 : Introduction to Simulation, Chapter 4: Simulation Software, Chapter 9: Input Modeling.

3. Robertazzi for Queuing Analysis.

COMPUTER VISION

UNIT- I

Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc.; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing.

UNIT- II

Edges , Canny, LOG, DOG; Line detectors (Hough Transform), Corners , Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale, Space Analysis, Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.

UNIT -III

Region Growing, Edge Based approaches to segmentation, Graph ,Cut, Mean, Shift, Texture Segmentation; Object detection.

UNIT- IV

Clustering: K,Means, K,Medoids, Mixture of Gaussians, Classification: Discriminate Function, Supervised, Un,supervised, Semi,supervised; Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non,parametric methods.

UNIT- V

Methods for 3D vision – projection schemes , shape from shading, photometric stereo ,shape from texture , shape from focus , active range finding , surface representations , polial based representation , volumetric representations, 3D object recognition , 3D reconstruction , introduction to motion , triangulation , bundle adjustmeat , translational alignment , parametric motion – spline, based motion ,optical flow , layered motion.

REFERENCES:

1. Richard Szeliski, Computer Vision: Algorithms and Application, Springer,Verlag London Limited 2011.

2. Computer Vision : A Modern Approach, D.A. Forsyth, J. Ponce, Pearson education , 2003.

3. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004.

4. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Addison, Wesley, 1992.

MACHINE LEARNING

UNIT - I

Introduction - Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering- Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

UNIT - II

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning **Artificial Neural Networks** – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm **Computational learning theory** – Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The mistake bound model of learning - **Instance-Based Learning**- Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning

Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

UNIT - IV

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules :FOIL, Induction as Inverted Deduction, Inverting Resolution

Analytical Learning- Introduction ,Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge.

UNIT - V

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators,

Reinforcement Learning – Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis(CRC)

REFERENCE BOOKS:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognitior, Oxford University Press, 1995.
4. Machine Learning by Peter Flach ,Cambridge.