Bapatla Engineering College::Bapatla

(*Autonomous*)

BAPATLA

Department of Computer Science and Engineering

B.Tech

Computer Science and Engineering

Curriculum Effective from A.Y. 2018-19

(R18 Regulations)

Bapatla Engineering College::Bapatla

(Autonomous under Acharya Nagarjuna University)

(Sponsored by Bapatla Education Society)

BAPATLA - 522102 Guntur District, A.P.,India
www.becbapatla.ac.in

Bapatla Engineering College::Bapatla
(Autonomous)
Department of Computer Science and Engineering

TABLE OF CONTENTS

S.No.	Category	Page No.
1	VISION, MISSION and PEOs	1
2	Transitory Regulations - R14 to R18 - Equivalence Subjects	2-5
3	Course Structure	6
4	List of Abbreviations	7
5	Scheme of Instruction and Examination	8-15
6	List of Institutional Electives	16
7	Semester – I Syllabus	17-31
8	Semester – II Syllabus	32-49
9	Semester – III Syllabus	50-68
10	Semester – IV Syllabus	69-87
11	Semester – V Syllabus	88-110
12	Semester – VI Syllabus	111-139
13	Semester – VII Syllabus	140-164
14	Semester – VIII Syllabus	165-174
15	Annexure - 1 : Institution Elective - I	175-208
16	Annexure - 2 : Institution Elective - II	209-245

BAPATLA ENGINEERING COLLEGE::BAPATLA
(Autonomous)

Computer Science and Engineering

VISION

- To produce Computer Science Engineers with Global Standards who can handle the challenges of the society and industry with their innovations and services.

MISSION

- To impart high quality education with effective teaching and learning process.
- To provide an environment where the students can handle research problems confidently.
- To prepare the students with latest technologies with fidelity towards industry.
- To inculcate professional ethics and human values in handling the engineering challenges.

PROGRAM EDUCATIONAL OBJECTIVES

- **PEO1:** Choose diverse professional careers in software industry, research, academia, engineering, and administrative services.
- **PEO2:** Apply the principles of basic sciences, mathematics and computer science to solve real world problems using digital computing systems.
- **PEO3:** Analyze, design, implement and evaluate robust, scalable and cost-effective computer-based systems and processes in the industry with sustained self learning.
- **PEO4:** Be aware of professional and ethical practices in the context of social impacts of computing.

Transitory Regulations - R14 to R18 - Equivalence Subjects

R-18 1-1 SEM		R-14 1-1 SEM		SEM
18MA001	Linear Algebra and ODE	14MA101	Engineering Mathematics – I	1.1
18CY001	Engineering Chemistry	14CY103 / 14CY203	Engineering Chemistry – I / Engineering Chemistry – II	1.1
18EL001	Communicative English	14EL204	Communicative English	1.2
18MEL01	Engineering Graphics	14EG106	Engineering Graphics	1.1
18CYL01	Chemistry Lab	14CYL101	Chemistry Lab	1.1
18ELL01	English Communication Lab	14ELL202	English Communication Skills Lab	1.2
18MEL02	Workshop	14WSL103	Workshop	1.1
18CE001	Environmental Studies	14ES105	Environmental Studies	1.1

R-18 1-2 SEM		R-14 1-2 SEM		SEM
18MA002	Numerical methods and Advanced Calculus	14MA201	Engineering Mathematics – II	1.2
18PH001	Semiconductor Physics	14PH102/ 14PH202	Engineering Physics – I/ Engineering Physics – II	1.2
18CS203	Professional Ethics & Human Values	14CS402	Professional Ethics and Human Values	2.2
18CS204	Digital Logic Design	14CS303	Digital Logic Design	2.1
18EE001	Basic Electronics & Electrical Engineering	14EE104	Basic Electrical and Electronics Engineering	1.1
18CS001	Problem Solving using Programming	14CP206	Problem Solving with Programming	1.2
18PHL01	Semiconductor Physics Lab	14PHL201	Physics lab	1.2
18EEL01	Basic Electronics & Electrical Engineering Lab	14HWL102	Hardware Lab	1.1
18CSL01	Problem Solving using Programming Lab	14CPL203	Problem Solving with Programming Lab	1.2

R-18 2-1 SEM		R-14 2-1 SEM		SEM
18MA003	Probability & Statistics	14MA301	Engineering Mathematics – III	2.1
18CS302	Data Structures	14CS305	Data Structures	2.1
18CS303	Discrete Mathematics	14CS302	Discrete Mathematical Structures	2.1

18CS304	Object Oriented Programming	14CS405	GUI Programming	2.2
18CS305	Operating System	14CS304	Operating System	2.1
18CS306	Microprocessor & Microcontrollers	14CS503	Microprocessor & Microcontrollers	3.1
18CSL31	Unix Programming Lab			
18CSL32	Data Structures Lab	14CSL302	Data Structures Lab	2.1
18CSL33	OOPs Lab	14CSL402	GUI Programming Lab	2.2

	R-18 2-2 SEM		**R-14 2-2 SEM**	**SEM**
18MA005	Operations Research	14MA401	Engineering Mathematics - IV	2.2
18CS402	Web Technologies	14CS406	Web Technologies	2.2
18CS403	Database Management System	14CS504	Database Management Systems	3.1
18CS404	Computer Organization	14CS403	Computer Organization	2.2
18EL002	Technical English			
18CS406	Design and Analysis of Algorithms	14CS404	Design and Analysis of Algorithms	2.2
18CSL41	Python Programming Lab			
18CSL42	Web Technologies Lab	14CSL403	Web Technologies Lab	2.2
18CSL43	RDBMS Lab	14CSL502	RDBMS Lab	3.1

	R-18 3-1 SEM		**R-14 3-1 SEM**	**SEM**
18CS501	Software Engineering	14CS501	Software Engineering	3.1
18CS502	Automata Theory & Formal Languages	14CS502	Automata Theory & Formal Languages	3.1
18CS503	Enterprise Programming	14CS604	Enterprise Programming-II	3.2
18CS504	Computer Networks	14CS603	Computer Networks	3.2
18CS505	Essence of Indian Traditional Knowledge			
18CSD1_	Department Elective-I	14CS506	Elective – I	3.1
18CSL51	C# Programming	14CSL303	OOPS Lab	2.1
18CSL52	Enterprise Programming Lab	14CSL602	Enterprise Programming-II Lab	3.2
18ELL02	Soft Skills Lab	14ELL701	Business Communication and Presentation Skills Lab	4.1
18CSMO1	MOOCs			

	R-18 3-2 SEM		**R-14 3-2 SEM**	**SEM**
18CS601	Machine Learning			

18CS602	Compiler Design	14CS602	Compiler Design	3.2
18CS603	Cryptography & Network Security			
18CS604	Middleware Technologies	14CS505	Enterprise Programming-I	3.1
18CSD2_	Department Elective-II	14CS606	Elective - II	3.2
18CSD3_	Department Elective-III	14CS705	Elective-III	4.1
18CSL61	Machine Learning Lab			
18CSL62	Middleware Technologies Lab	14CSL503	Enterprise Programming-I Lab	3.1
18CSLD2_	Dept. Elective-II Lab			

	R-18 4-1 SEM		**R-14 4-1 SEM**	**SEM**
18CS701	Full Stack Development			
18CS702	Wireless Networks	14CS704	Wireless Networks	4.1
18_ _I_ _	Institutional Elective -I	14OE706	Open Elective	4.1
18CSD4_	Department Elective-IV	14CS803	Elective – IV	4.2
18CS705	Constitution of India			
18CSL71	Unified Modeling Language Lab			
18CSL72	Full Stack Development Lab			
18CSLD4_	Dept. Elective-IV Lab			
18CSP01	Project - I	14CSL704	Term Paper	4.1
18CSII1	Internship			

	R-18 4-2 SEM		**R-14 4-2 SEM**	**SEM**
18ME005	Industrial Management & Entrepreneurship	14ME801	Industrial Management & Entrepreneurship	4.2
18_ _I_ _	Institutional Elective -II			
18CSD5_	Department Elective - V	14CS804	Elective - V	4.2
18CSP02	Project - II	14CSPR801	Project Work	4.2

List of Residual Subjects **to be completed by students** of R-14 Regulations who migrate into R-18 Regulations

R-14 Stream	R-18 Stream	Code	Subject Name
1-1 SEM	1-2 SEM	18EL001	Communicative English
		18ELL01	English Communication Lab
1-2 SEM	2-1 SEM	18CS203	Professional Ethics & Human Values
		18CS204	Digital Logic Design
2-1 SEM	2-2 SEM	18CS304	Object Oriented Programming
		18CS306	Microprocessor & Microcontrollers
		18CSL33	OOPs Lab
2-2 SEM	3-1 SEM	18CS403	Database Management System
		18EL002	Technical English
		18CSL41	Python Programming Lab
		18CSL43	RDBMS Lab
3-1 SEM	3-2 SEM	18CS503	Enterprise Programming
		18CS504	Computer Networks
		18CS505	Essence of Indian Traditional Knowledge
		18CSL52	Enterprise Programming Lab
		18ELL02	Soft Skills Lab
		18CSMO1	MOOCs
3-2 SEM	4-1 SEM	18CS601	Machine Learning
		18CS603	Cryptography & Network Security
		18CSD3_	Department Elective-III
		18CSL61	Machine Learning Lab
		18CSLD2_	Dept. Elective-II Lab
4-1, 4-2 SEM	The students have to continue with R14 regulation only		

COURSE STRUCTURE

Course Structure Summary:

S.No.	Category	Proposed	Percentage
1	Humanities & Social Science including Management Courses	9	6
2	Basic Science Courses	26	16
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	22	13
4	Professional Core Courses	71	41
5	Professional Elective Courses	17	11
6	Open Elective Courses	6	4
7	Project work, seminar and internship in industry or elsewhere	12	7
8	Industry Internship	2	1
9	MOOCs	2	1
10	Mandatory Courses [Indian Constitution, Essence of Indian Traditional Knowledge etc]	(non-credit courses)	--
	Total	**167**	**100**

Semester wise Credits

SEMESTER	Credits
I	16
II	22
III	24
IV	22
V	22
VI	21
VII	21
VIII	19
Total	**167**

List of Abbreviations	
CIE	Continuous Internal Evaluation
SEE	Semester End Examination
L	Lecture
T	Tutorial
P	Practical

BAPATLA ENGINEERING COLLEGE::BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Computer Science and Engineering

Effective from the Academic Year 2018-2019 (R18 Regulations)

First Year B.Tech (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
INDUCTION PROGRAM									
18MA001	Linear Algebra and ODE	4	0	0	4	50	50	100	3
18CY001	Engineering Chemistry	4	0	0	4	50	50	100	3
18CE001	Environmental Studies	3	0	0	3	50	50	100	2
18EL001	Communicative English	3	0	0	3	50	50	100	2
18MEL01	Engineering Graphics	1	0	4	5	50	50	100	3
18CYL01	Chemistry Lab	0	0	3	3	50	50	100	1
18MEL02	Workshop	0	0	3	3	50	50	100	1
18ELL01	English Communication Lab	0	0	3	3	50	50	100	1
	TOTAL	15	0	13	28	400	400	800	16

BAPATLA ENGINEERING COLLEGE::BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Computer Science and Engineering

Effective from the Academic Year 2018-2019 (R18 Regulations)

First Year B.Tech (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA002	Numerical methods and Advanced Calculus	4	0	0	4	50	50	100	3
18PH001	Semiconductor Physics	4	1	0	5	50	50	100	4
18CS203	Professional Ethics & Human Values	4	0	0	4	50	50	100	3
18CS204	Digital Logic Design	4	0	0	4	50	50	100	3
18EE001	Basic Electronics & Electrical Engineering	4	0	0	4	50	50	100	3
18CS001	Problem Solving using Programming	4	0	0	4	50	50	100	3
18PHL01	Semiconductor Physics Lab	0	0	3	3	50	50	100	1
18EEL01	Basic Electronics & Electrical Engineering Lab	0	0	3	3	50	50	100	1
18CSL01	Problem Solving using Programming Lab	0	0	3	3	50	50	100	1
	TOTAL	24	1	9	34	450	450	900	22

BAPATLA ENGINEERING COLLEGE::BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Computer Science and Engineering

Effective from the Academic Year 2018-2019 (R18 Regulations)

Second Year B.Tech (SEMESTER – III)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA003	Probability & Statistics	4	0	0	4	50	50	100	3
18CS302	Data Structures	4	0	0	4	50	50	100	3
18CS303	Discrete Mathematics	4	0	0	4	50	50	100	3
18CS304	Object Oriented Programming	4	0	0	4	50	50	100	3
18CS305	Operating System	4	0	0	4	50	50	100	3
18CS306	Microprocessor & Microcontrollers	4	0	2	6	50	50	100	4
18CSL31	Unix Programming Lab	2	0	3	5	50	50	100	3
18CSL32	Data Structures Lab	0	0	3	3	50	50	100	1
18CSL33	OOPs Lab	0	0	3	3	50	50	100	1
	TOTAL	26	0	11	37	450	450	900	24

BAPATLA ENGINEERING COLLEGE::BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Computer Science and Engineering

Effective from the Academic Year 2018-2019 (R18 Regulations)

Second Year B.Tech (SEMESTER – IV)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA005	Operations Research	4	0	0	4	50	50	100	3
18CS402	Web Technologies	4	0	0	4	50	50	100	3
18CS403	Database Management System	4	0	0	4	50	50	100	3
18CS404	Computer Organization	4	0	0	4	50	50	100	3
18EL002	Technical English	3	0	0	3	50	50	100	2
18CS406	Design and Analysis of Algorithms	4	0	0	4	50	50	100	3
18CSL41	Python Programming Lab	2	0	3	5	50	50	100	3
18CSL42	Web Technologies Lab	0	0	3	3	50	50	100	1
18CSL43	RDBMS Lab	0	0	3	3	50	50	100	1
	TOTAL	26	0	9	35	450	450	900	22

BAPATLA ENGINEERING COLLEGE::BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Computer Science and Engineering

Effective from the Academic Year 2018-2019 (R18 Regulations)

Third Year B.Tech (SEMESTER – V)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CS501	Software Engineering	4	0	0	4	50	50	100	3
18CS502	Automata Theory & Formal Languages	4	0	0	4	50	50	100	3
18CS503	Enterprise Programming	4	0	0	4	50	50	100	3
18CS504	Computer Networks	4	0	0	4	50	50	100	3
18CS505	Essence of Indian Traditional Knowledge	3	0	0	3	50	50	100	0
18CSD1_	Department Elective-I	4	0	0	4	50	50	100	3
18CSL51	C# Programming	2	0	3	5	50	50	100	3
18CSL52	Enterprise ProgrammingLab	0	0	3	3	50	50	100	1
18ELL02	Soft Skills Lab	0	0	3	3	50	50	100	1
18CSMO1	MOOCs								2
	TOTAL	25	0	9	34	450	450	900	22

Department Elective-I	
18CSD11	Advanced Computer Architecture.
18CSD12	Data Warehousing & Data Mining
18CSD13	Distributed Computing.

BAPATLA ENGINEERING COLLEGE::BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Computer Science and Engineering

Effective from the Academic Year 2018-2019 (R18 Regulations)

Third Year B.Tech (SEMESTER – VI)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CS601	Machine Learning	4	0	0	4	50	50	100	3
18CS602	Compiler Design	4	0	0	4	50	50	100	3
18CS603	Cryptography & NetworkSecurity	4	0	0	4	50	50	100	3
18CS604	Middleware Technologies	4	0	0	4	50	50	100	3
18CSD2_	Department Elective-II	4	0	0	4	50	50	100	3
18CSD3_	Department Elective-III	4	0	0	4	50	50	100	3
18CSL61	Machine Learning Lab	0	0	3	3	50	50	100	1
18CSL62	Middleware TechnologiesLab	0	0	3	3	50	50	100	1
18CSLD2_	Dept. Elective-II Lab	0	0	3	3	50	50	100	1
	TOTAL	24	0	9	33	450	450	900	21

Department Elective-II	
18CSD21	Mobile Application Development
18CSD22	Cloud Programming
18CSD23	Statistics with R

Dept. Elective-II Lab	
18CSLD21	Mobile Application Development Lab
18CSLD22	Cloud Programming Lab
18CSLD23	Statistics with R Lab

Department Elective-III	
18CSD31	Artificial Intelligence
18CSD32	Software Project Management
18CSD33	Block chain Technologies

BAPATLA ENGINEERING COLLEGE::BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Computer Science and Engineering

Effective from the Academic Year 2018-2019 (R18 Regulations)

Forth Year B.Tech (SEMESTER – VII)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CS701	Full Stack Development	4	0	0	4	50	50	100	3
18CS702	Wireless Networks	4	0	0	4	50	50	100	3
18_ _I_ _	Institutional Elective -I	4	0	0	4	50	50	100	3
18CSD4_	Department Elective-IV	4	0	0	4	50	50	100	3
18CS705	Constitution of India	3	0	0	3	50	50	100	0
18CSL71	Unified Modeling Language Lab	2	0	3	5	50	50	100	3
18CSL72	Full Stack Development Lab	0	0	3	3	50	50	100	1
18CSLD4_	Dept. Elective-IV Lab	0	0	3	3	50	50	100	1
18CSP01	Project - I	0	0	4	4	50	50	100	2
18CSII1	Internship					--	100	100	2
	TOTAL	21	0	13	34	450	550	1000	21

Department Elective-IV	
18CSD41	Cyber Security
18CSD42	Internet of Things
18CSD43	Big Data Analytics

Department Elective-IV Lab	
18CSLD41	Cyber Security Lab
18CSLD42	Internet of Things Lab
18CSLD43	Big Data Analytics Lab

BAPATLA ENGINEERING COLLEGE::BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Computer Science and Engineering

Effective from the Academic Year 2018-2019 (R18 Regulations)Forth Year B.Tech (SEMESTER – VIII)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18ME005	Industrial Management &Entrepreneurship Development	4	0	0	4	50	50	100	3
18_ _I_ _	Institutional Elective -II	4	0	0	4	50	50	100	3
18CSD5_	Department Elective - V	4	0	0	4	50	50	100	3
18CSP02	Project - II	0	0	10	10	75	75	150	10
	TOTAL	12	0	10	22	225	225	450	19

Department Elective – V	
18CSD51	Protocols for Secure Electronic Commerce
18CSD52	Artificial Neural Networks and Deep Learning
18CSD53	Natural Language Processing.

BAPATLA ENGINEERING COLLEGE::BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Computer Science and Engineering

List of Institutional Electives

Institutional Elective-I	
18CEI01	Air Pollution & Control
18CEI02	Rural Water Supply And Environment Sanitation
18CSI01	Java Programming
18CSI02	Database Management System
18ECI01	Digital Image Processing
18ECI02	Embedded Systems
18EEI01	Application of Wavelets to Engineering Problems
18EEI02	Industrial Electrical Systems
18EII01	Principles & Applications of MEMS
18EII02	Power Plant Instrumentation
18ITI01	Introduction to Data Analytics
18ITI02	Cyber Security
18MEI01	Fluid Power and Control Systems
18MEI02	Project Management
18MAI01	Linear Algebra
18PHI01	Nano-Materials and Technology
18PHI02	Fiber Optics Communications

Institutional Elective-II	
18CEI03	Disaster Management
18CEI04	Remote sensing & GIS
18CSI03	Python Programming
18CSI04	Computer Networks
18ECI03	Wireless Communications
18ECI04	Artificial Neural Networks
18EEI03	High Voltage Engineering
18EEI04	Electrical Energy Conservation and Auditing
18EII03	Robotics and Automation
18EII04	Sensors And Signal Conditioning
18ITI03	Mobile Application Developments
18ITI04	Web Technologies
18MEI03	Non-Conventional Energy Sources
18MEI04	Automobile Engineering
18MAI02	Graph Theory
18PHI03	Advanced Materials
18PHI04	Opto Electronic Devices And Applications
18ELI03	Professional Communication

LINEAR ALGEBRA AND ODE
I B.Tech – I Semester (Code: 18MA001)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Solve a system of linear homogeneous and non-homogeneous equations, finding the inverse of a given square matrix and also its Eigen values and Eigen vectors.
- Identify the type of a given differential equation and select and apply the appropriate analytical technique for finding the solution of first order and higher order ordinary Differential equations.
- Create and analyze mathematical models using first and second order differential equations to solve application problems that arises in engineering.
- Solve a linear differential equation with constant coefficients with the given initial conditions using Laplace Transforms.

Course Outcomes: At the end of the course students will be able to

CO1	Find the eigen values and eigen vectors of a given matrix and its inverse.
CO2	Apply the appropriate analytical technique to find the solution of a first order ordinary differential equation.
CO3	Solve higher order linear differential equations with constant coefficients arise in engineering applications.
CO4	Apply Laplace transforms to solve differential equations arising in engineering

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO'S												PSO'S		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	2	-	-	-	-	-	-	-	-	2	-	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	2	-	2	-
CO3	3	3	3	-	-	-	-	-	-	-	-	2	-	2	-
CO4	3	3	3	-	-	-	-	-	-	-	-	2	-	2	-

UNIT-1 — 15 Periods

Linear Algebra: Rank of a Matrix; Elementary transformations of a matrix; Gauss-Jordan method of finding the inverse;
Consistency of linear System of equations: Rouches theorem, System of linear Non-homogeneous equations, System of linear homogeneous equations; vectors; Eigen values; properties of Eigen values (without proofs); Cayley-Hamilton theorem (without proof). [Sections: 2.7.1; 2.7.2; 2.7.6; 2.10.1; 2.10.2; 2.10.3; 2.12.1; 2.13.1; 2.14; 2.15.]

UNIT-2 — 15 Periods

Differential Equations of first order: Definitions; Formation of a Differential equation; Solution of a Differential equation; Equations of the first order and first degree; variables separable; Linear Equations; Bernoulli's equation; Exact Differential equations.
Equations reducible to Exact equations: I.F found by inspection, I.F of a Homogeneous equation, In the equation M dx+ N dy=0, $\frac{\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}}{N}$ is a function of x and $\frac{\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}}{M}$ is a function of y.
Applications of a first order Differential equations: Newton's law of cooling; Rate of

decay of Radio-active materials. [Sections: 11.1; 11.3; 11.4; 11.5; 11.6; 11.9; 11.10; 11.11; 11.12.1; 11.12.2; 11.12.4; 12.6; 12.8]	
UNIT-3	15 Periods
Linear Differential Equations: Definitions; Theorem; Operator D; Rules for finding the complementary function; Inverse operator; Rules for finding the Particular Integral; Working procedure to solve the equation; Method of Variation of Parameters; Applications of Linear Differential Equations: Oscillatory Electrical Circuits. [Sections: 13.1; 13.2.1; 13.3; 13.4; 13.5; 13.6; 13.7;13.8.1;14.1;14.5]	
UNIT-4	15 Periods
Laplace Transforms: Definition; conditions for the existence; Transforms of elementary functions; properties of Laplace Transforms; Transforms of derivatives; Transforms of integrals; Multiplication by t^n; Division by t; Inverse transforms- Method of partial fractions; Other methods of finding inverse transforms; Convolution theorem(without proof); Application to differential equations: Solution of ODE with constant coefficients using Laplace transforms. [Sections:21.2.1; 21.2.2; 21.3; 21.4; 21.7; 21.8; 21.9; 21.10; 21.12; 21.13; 21.14; 21.15.1]	
Text Books :	1. B.S.Grewal, "Higher Engineering Mathematics", 44thedition, Khanna publishers, 2017.
References :	1. ErwinKreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons. 2. N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics" Laxmi Publications, 2010.

ENGINEERING CHEMISTRY
(Common to all branches)
I B. Tech. – I Semester (Code: 18CY001)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: At the end of the course students will be able to

- With the principles of water characterization and treatment of water for industrial purposes and methods of producing water for potable purposes.
- To understand the thermodynamic concepts, energy changes, concept of corrosion & its control.
- With the conventional energy sources, solid, liquid and gaseous Fuels & knowledge of knocking and anti-knocking characteristics
- With aim to gain good knowledge of organic reactions, plastics, conducting polymers & biodegradable polymers.

Course Outcomes: Students will be able to

CO1	Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
CO2	Apply their knowledge in converting various energies of different systems and protection of different metals from corrosion.
CO3	Have the capacity of applying energy sources efficiently and economically for various needs.
CO4	With aim to gain good knowledge of organic reactions, plastics, conducting polymers & biodegradable polymers.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO'S												PSO'S		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	3	2	3	-	2	3	-	-	-	-	3	-	-	-
CO2	2	3	2	3	-	2	3	-	-	-	-	3	-	-	-
CO3	2	3	2	3	-	2	3	-	-	-	-	3	-	-	-
CO4	2	3	3	3	-	2	3	-	-	-	-	3	-	-	-

UNIT-1 15 Periods

Introduction: water quality parameters
Characteristics: Alkalinity, Hardness - Estimation & simple neumerical problems,
Boiler Troubles - Sludges, Scales, Caustic embrittlement, boiler corrosion, Priming and foaming;
Internal conditioning- phosphate, calgon and carbonate methods.
External conditioning - Ion exchange process & Zeolite proess WHO Guidelines, Potable water, Sedimentation, Coagulation, Filtration.
Disinfection methods: Chlorination, ozonization and UV treatment.
Salinity – Treatment of Brackish water by Reverse Osmosis and Electrodialysis.

UNIT-2 15 Periods

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and freeenergies. Free energy and emf. Cell potentials, the Nernst equation and applications.
Corrosion: Types of corrosion - Chemical or dry corrosion, Electrochemical or wet corrosion;Galvanic, stress, pitting and differential aeration corrosion; Factors effecting

corrosion,
Corrosion control – Cathodic protection, and electro plating (Au) & electrodes Ni plating.

UNIT-3	15 Periods

Fuels: Classification of fuels; Calorific value of fuels (lower, higher)
Solid fuels: Determination of calorific value (Bomb Calorimeter) & related problems, Coal ranking.
Liquid Fuels: Petroleum refining and fractions, composition and uses. Knocking and anti-
knocking Agents, Octane number and Cetane number; Bio fuels- Biodiesel, general methods of preparation and advantages Gaseous fuels: CNG and LPG, Flue gas analysis – Orsat apparatus.

UNIT-4	15 Periods

Organic reactions and synthesis of a drug molecule
Introduction to reactions involving substitution (SN^1, SN^2), addition (Markownikoff's and anti-Markwnikoff's rules), elimination (E_1& E_2), Synthesis of a commonly used drug molecule. (Aspirin and Paracetamol)
Polymers: Conducting polymers: Classification, Intrinsic and Extrinsic conducting polymers and their applications. Plastics: Thermoplasts and thermosetting plastics, Bskelite and PVC. Bio degradable polymers: types, examples-Polyhydroxybuterate (PHB), Polyhydroxybuterate-co-β-hydroxyvalerate (PHBV), applications.

Text Books :	1. P.C. Jain and Monica Jain, "Engineering Chemistry" DhanpatRai Pub, Co., New Delhi 17th edition (2017). 2. SeshiChawla, "Engineering Chemistry" DhanpatRai Pub, Co LTD, New Delhi 13 th edition, 2013.
References :	1. Essential Of Physical Chemistry by ArunBahl, B.S. Bahl, G.D.Tuli, by ArunBahl, B.S. Bahl, G.D.Tuli, Published by S Chand Publishers, 12th Edition, 2012. 2. Text Book of Engineering Chemistry by C.P. Murthy, C.V. Agarwal, A. Naidu B.S. Publications, Hyderabad (2006). 3. Engineering Chemistry by K. Maheswaramma, Pearson publishers 2015.

ENVIRONMENTAL STUDIES

I B. Tech. –I Semester (Code: 18CE001)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- To develop an awareness, knowledge, and appreciation for the natural environment.
- To understand different types of ecosystems exist in nature.
- To know our biodiversity.
- To understand different types of pollutants present in Environment.
- Create awareness among the youth on environmental concerns important in the long-term interest of the society

Course Outcomes: At the end of the course students will be able to

CO1	Develop an appreciation for the local and natural history of the area.
CO2	Hope for the better future of environment in India which is based on many positive factors like Biodiversity, successive use of renewable energy resources and other resources, increasing number of people's movements focusing on environment.
CO3	Know how to manage the harmful pollutants. Gain the knowledge of Environment.
CO4	Create awareness among the youth on environmental concerns important in the long-term interest of the society.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO'S												PSO'S		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	-	3	3	-	-	-	-	2	-	-	-
CO2	-	-	-	-	-	3	3	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	3	3	-	-	-	-	2	-	-	-
CO4	-	-	-	-	-	3	3	-	-	-	-	2	-	-	-

UNIT-1 | 15 Periods

Introduction: Definition, Scope and Importance, Need for public awareness. Ecosystems: Definition, Structure and Functions of Ecosystems, types - Forest, Grassland, Desert, Aquatic (Marine, pond and estuaries).

Biodiversity: Definition and levels of Biodiversity; Values of Biodiversity - Consumptive, Productive, Social, Aesthetic, Ethical and Optional; Threats and Conservation of Biodiversity;

Hot Spots of Biodiversity, Bio-geographical Classification of India, India as a mega diversity nation. Chipko movement case study

UNIT-2 | 15 Periods

Natural resources: Land: Land as a resource, Causes and effects of land degradation - Soil erosion, Desertification. Forest: Use of forests, Causes and effects of deforestation, Afforestation, Mining - benefits and problems. Water: Uses, floods and drought, Dams - benefits and problems.

Energy: Importance of energy, Environmental Impacts of Renewable and Non-renewable energy resources. Silent Valley Project and Narmada BachaoAndolan case studies Sustainability: Definition, Concept and Equitable use of resources for sustainable development; Rain water harvesting and Watershed management. Fieldwork on Rain water harvesting and Watershed management.

UNIT-3	15 Periods
Pollution: Definition; Causes, effects and control of air, water and nuclear pollution; Chernobyl Nuclear Disaster case study; Solid Waste: urban, Industrial and hazardous wastes; Integrated waste management - 3R approach, composting and vermicomposting. Environmental acts: Water and air (Prevention and Control of pollution) acts, Environmental protection act, Forest Conservation act.	
UNIT-4	15 Periods
Environmental issues: Green house effect & Global warming, Ozone layer depletion, Acid rains, Green Revolution, Population Growth and environmental quality, Environmental Impact Assessment. Environmental Standards (ISO 14000, etc.) Case Studies: Bhopal Tragedy, Mathura Refinery and TajMahal, and Ralegan Siddhi (Anna Hazare). Field work: Visit to a local area to document environmental assets – Pond/Forest/Grassland. Visit to a local polluted site- Urban and industry/ Rural and Agriculture.	
Text Books :	1. "Environmental Studies" by Benny Joseph, Tata McGraw-Hill Publishing Company Limited, New Delhi. 2. "Comprehensive environmental studies"- JP Sharma, Laxmi Publications. Text Book of environmental Studies – ErachBharucha
References :	1. "Environmental studies", R.Rajagopalan, Oxford University Press. 2. "Introduction to Environmental Science", Anjaneyulu Y, B S Publications "Environmental Science", 11th Edition – Thomson Series – By Jr. G. Tyler Miller.

COMMUNICATIVE ENGLISH
I B. Tech. – I Semester (Code: 18EL001)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- To comprehend the importance, barriers and strategies of listening skills in English.
- To illustrate and impart practice Phonemic symbols, stress and intonation.
- To practice oral skills and receive feedback on learners' performance.
- To practice language in various contexts through pair work, role plays, group work and dialogue conversations

Course Outcomes: At the end of the course students will be able to

CO1	Understand how to build academic vocabulary to enrich their writing skills.
CO2	Produce accurate grammatical sentences.
CO3	Analyse the content of the text in writing.
CO4	Produce coherent and unified paragraphs with adequate support and detail.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO'S												PSO'S		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	-	-	-	2	2	3	2	2	-	2	-
CO2	-	-	-	-	-	-	-	2	2	3	2	2	-	2	-
CO3	-	-	-	-	-	-	-	2	2	3	2	2	-	2	-
CO4	-	-	-	-	-	-	-	2	2	3	2	2	-	2	-

UNIT-1 — 15 Periods

1.1 Vocabulary Development: Word formation-Formation of Nouns, Verbs & Adjectives from Root words-Suffixes and Prefixes
1.2 Essential Grammar: Prepositions, Conjunctions, Articles
1.3 Basic Writing Skills: Punctuation in writing
1.4 Writing Practices: Mind Mapping, Paragraph writing (structure-Descriptive, Narrative, Expository & Persuasive)

UNIT-2 — 15 Periods

2.1 Vocabulary Development: Synonyms and Antonyms
2.2 Essential Grammar: Concord, Modal Verbs, Common Errors
2.3 Basic Writing Skills: Using Phrases and clauses
2.4 Writing Practices: Hint Development, Essay Writing

UNIT-3 — 15 Periods

3.1 Vocabulary Development: One word Substitutes
3.2 Essential Grammar: Tenses, Voices
3.3 Basic Writing Skills: Sentence structures (Simple, Complex, Compound)
3.4 Writing Practices: Note Making

UNIT-4 — 15 Periods

4.1 Vocabulary Development: Words often confused
4.2 Essential Grammar: Reported speech, Common Errors
4.3 Basic Writing Skills: Coherence in Writing: Jumbled Sentences
Writing Practices: Paraphrasing &Summarizing

Text Books :	1. Communication Skills, Sanjay Kumar &PushpaLatha. Oxford University Press:2011. 2. Practical English Usage, Michael Swan. Oxford University Press:1995. 3. Remedial English Grammar, F.T.Wood. Macmillan:2007. 4. Study Writing, Liz Hamplyons & Ben Heasley. Cambridge University Press:2006

ENGINEERING GRAPHICS

I B. Tech. – I Semester (Code: 18MEL01)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Clear picture about the importance of engineering graphics in the field of engineering
- The drawing skills and impart students to follow Bureau of Indian Standards
- To give an idea about Geometric constructions, Engineering curves, orthographic projections and pictorial projections
- Imagination skills about orientation of points, lines, surfaces and solids basic drafting skills of Auto CAD

Course Outcomes: At the end of the course students will be able to

CO1	Draw projections of points and projections of lines using Auto CAD
CO2	Plot projections of surfaces like circle, square and rhombus
CO3	Plot the Projections of solids like Prisms and pyramids
CO4	Convert the of Orthographic views into isometric views of simple objects

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	1	2	1	-	-	-	-	-	-	-	-	-	1	1	2
CO2	3	2	1	-	-	-	-	-	-	-	-	-	2	3	2
CO3	1	2	3	-	-	-	-	-	-	-	-	-	1	3	2
CO4	1	2	1	-	-	-	-	-	-	-	-	-	1	2	2

UNIT-1 — 15 Periods

INTRODUCTION: Introduction to Drawing instruments and their uses, geometrical construction procedures

INTRODUCTION TO AUTOCAD:

Basics of sheet selection, Draw tools, Modify tools, dimensioning

METHOD OF PROJECTIONS: Principles of projection - First angle and third angle projection of points. Projection of straight lines. Traces of lines.

UNIT-2 — 15 Periods

PROJECTIONS OF PLANES: Projections of plane figures: circle, square, rhombus, rectangle, triangle, pentagon and hexagon.

UNIT-3 — 15 Periods

PROJECTIONS OF SOLIDS: Projections of Cubes, Prisms, Pyramids, Cylinders and Cones

Inclined to one plane

UNIT-4 — 15 Periods

ISOMETRIC PROJECTIONS: Isometric Projection and conversion of Orthographic views into isometric views. (Treatment is limited to simple objects only).

UNIT-5 — 15 Periods

ORTHOGRAPHIC PROJECTIONS: Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings).

Text Books :	1. Engineering Drawing with AutoCAD by Dhananjay M. Kulkarni (PHI publication) 2. Engineering Drawing by N.D. Bhatt & V.M. Panchal. (Charotar PublishingHouse, Anand). (First angle projection)
References :	1. Engineering Drawing by Dhananjay A Jolhe, Tata McGraw hill publishers 2. Engineering Drawing by Prof.K.L.Narayana& Prof. R.K.Kannaiah.

CHEMISTRY LAB

I B.Tech –I Semester (Code: 18CYL01)

Lectures	:	3 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- The basics of chemistry lab to carry out the qualitative and quantitative analysis of any given sample.
- To determine the percentage purity of washing soda bleaching powder and given salt. The measurement of quality parameters of water to check its suitability for domestic and industrial purpose
- To estimate the characteristic properties of oil for its use at various level
- To synthesize the Soap, Resin and Aromatic Ester followed by their applications. The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications

Course Outcomes: At the end of the course students will be able to

CO1	Familiar with fundamental basics of Chemistry lab
CO2	Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.
CO3	Gain the knowledge regarding the quality parameters of water & oil like Salinity, hardness, alkalinity saponification and iodine value.etc.
CO4	Prepare high polymers and soap & Instrumentation techniques

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	2	2	-	2	-	-	-	-	-	2	-	-	-
CO3	2	2	2	2	-	2	-	-	-	-	-	2	-	-	-
CO4	2	2	2	2	-	-	-	-	-	-	-	2	-	-	-

LIST OF EXPERIMENTS

1. Introduction to Chemistry Lab (the teachers are expected to teach fundamentals like Calibration of Volumetric Apparatus, Primary, Secondary Solutions, Normality, Molarity, Molality etc. and error, accuracy, precision, theory of indicators, use of volumetric titrations).

2. Volumetric Analysis:
   a. Estimation of Washing Soda.
   b. Estimation of Active Chlorine Content in Bleaching Powder
   c. Estimation of Mohr's salt by permanganometry.
   d. Estimation of given salt by using Ion-exchange resin using Dowex-50.

3. Analysis of Water:
   a. Determination of Alkalinity of Tap water.
   b. Determination of Total Hardness of ground water sample by EDTA method
   c. Determination of Salinity of water sample.

4. Estimation of properties of oil:
   a. Estimation of Acid Value
   b. Estimation of Saponification value.

5. Preparations: a. Preparation of Soap b. Preparation of Urea-formaldehyde resin c. Preparation of Phenyl benzoate. 6. Demonstration Experiments (Any two of the following): a. Determination of p^H of given sample. b. Determination of conductivity of given sample by conductometer. c. Potentiometric Determination of Iron.	
Text Books :	1. Practical Engineering Chemistry by K.Mukkanti, Etal, B.S. Publicaitons, Hyderabad, 2009. 2. Inorganic quantitative analysis, Vogel, 5th edition, Longman group Ltd. London, 1979.
References :	1. Text Book of engineering chemistry by R.n. Goyal and HarrmendraGoel. 2. A text book on experiments and calculations- Engineering Chemistry. S.S.Dara. 3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

WORKSHOP

I B. Tech. – I Semester (Code: 18MEL02)

Lectures	:	3 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- To impart student knowledge on various hand tools for usage in engineering applications.
- Be able to use analytical skills for the production of components.
- Design and model different prototypes using carpentry, sheet metal and welding.
- Electrical connections for daily applications.
- To make student aware of safety rules in working environments.

Course Outcomes: At the end of the course students will be able to

CO1	Make half lap joint, Dovetail joint and Mortise & Tenon joint.
CO2	Produce Lap joint, Tee joint and Butt joint using Gas welding.
CO3	Prepare trapezoidal tray, Funnel and T-joint using sheet metal tools.
CO4	Make connections for controlling one lamp by a single switch, controlling two lamps by a single switch and stair case wiring.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	3	2	-	2	-	2	-	-	1	-	2	1	2	3
CO2	2	3	2	-	2	-	2	-	-	1	-	2	1	2	3
CO3	2	3	2	-	2	-	2	-	-	1	-	1	1	2	3
CO4	-	-	2	-	2	-	2	-	-	1	-	1	-	-	2

1. Carpentry
   a. Half Lap joint
   b. Dovetail joint
   c. Mortise &Tenon joint
1. Welding using electric arc welding process/gas welding
   a. Lap joint
   b. Tee joint
   c. Butt joint
2. Sheet metal operations with hand tools
   a. Trapezoidal tray
   b. Funnel
   c. T-joint
3. House wiring
   a. To control one lamp by a single switch
   b. To control two lamps by a single switch

Stair-case wiring

Text Books :	1. P.Kannaiah and K.L.Narayana, Workshop Manual, SciTech Publishers, 2009. 2. K. Venkata Reddy, Workshop Practice Manual, BS Publications, 2008

ENGLISH COMMUNICATION LAB

I B. Tech. – I Semester (Code: 18ELL01)

Lectures	:	3 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- To comprehend the importance, barriers and strategies of listening skills in English.
- To illustrate and impart practice Phonemic symbols, stress and intonation.
- To practice oral skills and receive feedback on learners' performance.
- To practice language in various contexts through pair work, role plays, group work and dialogue conversations

Course Outcomes: At the end of the course students will be able to

CO1	Better understand the nuances of English language through audio- visual experience and group activities.
CO2	Develop neutralization of accent for intelligibility.
CO3	Build confidence to enhance their speaking skills.
CO4	Use effective vocabulary both in formal and informal situations.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	-	-	-	-	3	2	2	2	-	2	-
CO2	-	-	-	-	-	-	-	-	3	2	2	2	-	2	-
CO3	-	-	-	-	-	-	-	-	3	2	2	2	-	2	-
CO4	-	-	-	-	-	-	-	-	3	2	2	2	-	2	-

1.1 Listening Skills; Importance – Purpose- Process- Types
1.2 Barriers to Listening
1.3 Strategies for Effective Listening

2.1 Phonetics; Introduction to Consonant, Vowel and Diphthong sounds
2.2 Stress
2.3 Rhythm
2.4 Intonation

3.1 Formal and Informal Situations
3.2 Expressions used in different situations
3.3 Introducing Yourself & Others-Greeting & Parting-Congratulating-Giving Suggestions & Advices-Expressing Opinions-Inviting People-Requesting-Seeking Permission-Giving Information- Giving Directions- Sympathizing- Convincing People- Complaining & Apologizing-Thanking Others- Shopping- Travelling- Conversational Gambits

4.1 JAM Session
4.2 Debates
4.3 Extempore

Text Books :	1. Communication Skills, Sanjay Kumar and Pushpa Lata. Oxford UniversityPress. 2011 2. Better English Pronunciation, J.D. O' Connor. Cambridge University Press:1984 3. New Interchange (4rth Edition), Jack C Richards. Cambridge University Press:2015 4. English Conversation Practice, Grant Taylor. McGraw Hill:2001
Software:	1. Buzzers for conversations, New Interchange series 2. English in Mind series, Telephoning in English 3. Speech Solutions, A Course in Listening and Speaking

NUMERICAL METHODS AND ADVANCED CALCULUS

I B. Tech. –II Semester (Code: 18MA002)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Solve algebraic, transcendental and system of linear equations with the help of numerical methods.
- Apply the techniques numerical integration whenever and wherever routine methods are not applicable and solve the first order ordinary differential equations numerically with the given initial condition using different methods.
- Evaluate double and triple integrals and apply them to find areas and volumes.
- Evaluate the line, surface and volume integrals and learn their inter-relations and applications.

Course Outcomes: At the end of the course students will be able to

CO1	Solve non-linear equations and system of linear equations with the help of Numerical techniques.
CO2	Solve the first order ordinary differential equations numerically with the given initial condition.
CO3	Find the area and volume of plane and three dimensional figures using multiple integrals.
CO4	Apply vector integral theorems to obtain the solutions of engineering problems involving circulation, flux, and divergence in vector fields.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	2	-	-	-	-	-	-	-	-	2		3	
CO2	3	3	2	-	-	-	-	-	-	-	-	2		3	
CO3	3	3	2	-	-	-	-	-	-	-	-	2		2	
CO4	3	3	2	-	-	-	-	-	-	-	-	2		3	

UNIT-1 — 15 Periods

Numerical Solution of Equations: Introduction: Solution of algebraic and transcendental equations: Bisection method, Method of false position, Newton-Raphson method; Useful deductions from the Newton-Raphson formula; Solution of linear simultaneous equations; Direct methods of solution: Gauss elimination method, Gauss-Jordan method, Factorization method; Iterative methods of solution: Jacobi's iterative method, Gauss-Seidel iterative method.

[Sections: 28.1; 28.2; 28.3; 28.5; 28.6; 28.7.1;28.7.2].

UNIT-2 — 15 Periods

Finite differences and Interpolation: Finite differences: Forward differences, Backward differences; Newton's interpolation formulae: Newton's forward interpolation formula, Newton's backward interpolation formula; Interpolation with unequal intervals; Lagrange's interpolation formula; Divided differences; Newton's divided difference formula; Numerical integration; Trapezoidal rule; Simpson's one-third rule; Simpson's three-eighth rule; Numerical solution of ODE's: Introduction; Picard's method; Euler's method; Runge-Kutta method.

[Sections:29.1; 29.1-1; 29.1.2; 29.6; 29.9; 29.10; 29.11; 29.12; 30.4; 30.6; 30.7; 30.8; 32.1; 32.2; 32.4; 32.7].

UNIT-3	15 Periods
Multiple Integrals: Double integrals; Change of order of integration; Double integrals in polar coordinates; Area enclosed by plane curves; Triple integrals; Volumes of solids: Volumeas Triple integrals, Change of variables. [Sections: 7.1; 7.2; 7.3; 7.4; 7.5; 7.6.2; 7.7.2].	
UNIT-4	15 Periods
Vector calculus and its applications: Scalar and vector point functions; Del applied to scalar point functions-Gradient: Definition, Directional derivative; Del applied to vector point functions: Divergence, Curl; Line integral; Surfaces: Surface integral, Flux across a surface; Green's theorem in the plane (without proof); Stokes theorem (without proof); Gauss divergence theorem (without proof). [Sections: 8.4; 8.5.1; 8.5.3; 8.6; 8.11; 8.12; 8.13; 8.14; 8.16]	
Text Books :	1. B.S.Grewal, "Higher Engineering Mathematics", 44thedition, Khanna publishers, 2017.
References :	1. ErwinKreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons. 2. N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics" Laxmi Publications, 2010.

SEMICONDUCTOR PHYSICS
I B. Tech. II-semester: CODE:18PH001
(Common for CSE, IT, EEE, & EIE)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- This unit aim to build the foundation and inspires interest of freshmen into electrical and electronics and to focus on fundamental concepts and basic principlesregarding electrical conduction.
- This unit provides various properties of semiconductor materials and their importance in various device fabrications
- This unit aim to educate the student on various opto-electronic devices and their applications.
- This unit provide information about the principles of processing, manufacturing and characterization of nano materials, nanostructures and their applications

Course Outcomes: At the end of the course students will be able to

CO1	Recognize the concepts of hole, effective mass of the electron in semiconductors, and band structure of solids.
CO2	Know the concept of Fermi level and various semiconductor junctions.
CO3	Knowledge the principles of operation and applications of various opto-electronic devices.
CO4	Recognize the significance of nanomaterials and their distinctive features.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2	-	2	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	2	2	-	-	-	-	-	-	-	-	2	-	-
CO3	3	-	-	2	2	-	2	-	-	-	2	-	2	-	-
CO4	3	-	-	2	2	-	-	--	-	-	2	2	2	-	-

UNIT-1 15 Periods

ELECTRONIC MATERIALS:

Somerfield free electron theory, Fermi level and energy, density of states, Failure of free electron theory (Qualitative), Energy bands in solids, E-K diagrams, Direct and Indirect band gaps. Types of Electronic materials: Metals, Semi conductors and Insulators, OccupationProbability, effective mass, Concept of hole

UNIT-2 15 Periods

SEMICONDUCTORS:

Introduction to semiconductors, intrinsic and extrinsic semiconductors, carrier concentrations, Fermi level and temperature dependence, Continuity equation, Diffusion and drift, P-N junction (V-I characteristics), Metal – Semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for opto- electronic devices.

UNIT-3 15 Periods

OPTO-ELECTRONIC DEVICES AND DISPLAY DEVICES:

Photo voltaic effect, principle and working of LED, Applications of Photo diode, Solar cell,PIN & APD Diode, Liquid crystal display, Opto electric effect: Faraday Effect and Kerr effect.

UNIT-4		15 Periods
NANO-MATERIALS: Introduction to nano technology, quantum confinement, surface to volume ratio, properties ofnano materials, synthesis of nano-materials: CVD, sol-gel methods, laser ablation. Carbon nano tubes: types, properties, applications. Characterization of nano materials: XRD, SEM, applications of nano materials.		
Text Books :	1. A text book of engineering physics by Avadhanulu and Kshirsagar S.Chand & Co. (2013) 2. Applied physics by Dr.*P.Srinivasa Rao*. Dr.K.*Muralidhar* 3. Introduction to solid state state physics, Charles Kittel, 8th edition 4. Solid state physics, S.O. Pillai	
References :	1. Text book on Nanoscience and Nanotechnology (2013): B.S. Murty, P. Shankar, Baldev Raj, B.B. Rath and J. Murday, Springer Science & Business Media. 2. Basic Engineering Physics, Dr.*P.Srinivasa Rao*. Dr.K.*Muralidhar.* Himalaya Publications, 2016	

PROFESSIONAL ETHICS & HUMAN VALUES
(Common for all branches)
I B. Tech. – II Semester (Code:18CS203)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Comprehend a specific set of behavior and values any professional must know and must abide by, including confidentiality, honesty and integrity. Understand engineering as social experimentation.
- Know, what are safety and Risk and understand the responsibilities and rights of an engineer such as collegiality, loyalty, bribes/gifts.
- Recognize global issues visualizing globalization, cross-cultural issues, computer ethics and also know about ethical audit
- Discuss case studies on Bhopal gas tragedy, Chernobyl and about codes of Institute of Engineers, ACM

Course Outcomes: At the end of the course students will be able to

CO1	Acquires the basic concepts of Professional ethics and human values & Students also gain the connotations of ethical theories.
CO2	Knows the duties and rights towards the society in an engineering profession
CO3	Would realize the importance and necessity of intellectual property rights.
CO4	Debate on Ethical Theories like Kohlberg's Theory, Gilligan's Argument.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	-	3	3	3	-	-	-	3	-	-	-
CO2	-	-	-	-	-	3	3	3	-	-	-	3	-	-	-
CO3	-	-	-	-	-	3	3	3	-	-	-	3	-	-	-
CO4	-	-	-	-	-	3	3	3	-	-	-	3	-	-	-

UNIT-1 15 Periods

Human Values: Morals, Values and Ethics, Integrity, Work Ethics, Service and Learning, Civic Virtue, Respect for Others, Living Peacefully, Caring and Sharing, Honesty, Courage, Value Time, Cooperation, Commitment and Empathy, Spirituality, Character.

Engineering Ethics: History of Ethics, Engineering Ethics, Consensus and Controversy, Profession and Professionalism, Professional Roles of Engineers, Self Interest, Customs and Religion, Uses of Ethical Theories, Professional Ethics, Types of Inquiry, Kohlberg's Theory,Gilligan's Argument, Heinz's Dilemma.

Engineering as Social Experimentation: Comparison with Standard Experiments, Knowledge Gained, Conscientiousness, Relevant Information, Learning from the Past, Engineers as Managers, Consultants, and Leaders, Accountability, Roles of Codes, Codes andExperimental Nature of Engineering.

UNIT-2 15 Periods

Engineers' Responsibility for Safety and Risk: Safety and Risk, Types of Risks, Safety and the Engineer, Designing for Safety, Risk-Benefit Analysis, Accidents. Responsibilities and Rights: Collegiality, Two Senses of Loyalty, Obligations of Loyalty, Misguided Loyalty, Professionalism and Loyalty, Professional Rights, Professional Responsibilities, Conflict of Interest, Self-interest, Customs and Religion, Collective Bargaining, Confidentiality, Acceptance of Bribes/Gifts, Occupational Crimes, Whistle Blowing.

UNIT-3	15 Periods

Global Issues: Globalization, Cross-cultural Issues, Environmental Ethics, Computer Ethics, Weapons Development, Ethics and Research, Analyzing Ethical Problems in Research, Intellectual Property Rights (IPRs).
Ethical Audit: Aspects of Project Realization, Ethical Audit Procedure, The Decision Makers, Variety of Interests, Formulation of the Brief, The Audit Statement, The Audit Reviews.

UNIT-4	15 Periods

Case Studies: Bhopal Gas Tragedy, The Chernobyl Disaster.
Appendix 1: Institution of Engineers (India): Sample Codes of Ethics.
Appendix 2: ACM Code of Ethics and Professional Conduct.

Text Books :	"Professional Ethics & Human Values", M.Govinda Rajan, S.Natarajan, V.S.Senthil Kumar, PHI Publications 2013.
References :	"Ethics in Engineering", Mike W Martin, Ronald Schinzinger, TMH Publications.

DIGITAL LOGIC DESIGN

I B.Tech – II Semester(Code: 18CS204)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: Basic Computer Knowledge.

Course Objectives: Students will be able to

- Understand of the fundamental concepts and techniques used in digital electronics, and Number conversions.
- Understand basic arithmetic operations in different number systems and simplification of Boolean functions using Boolean algebra and K-Maps.
- Simplify the Boolean functions using Tabulation method, Concepts of combinational logic circuits.
- Understand the concepts of Flip-Flops, Analysis of sequential circuits
- Understand the concepts of Registers, Counters and classification of Memory units.

Course Outcomes: At the end of the course students will be able to

CO1	Understand different number systems and binary codes and conversion between number system. Understand and apply boolean algebra and K-maps to simplify boolean functions
CO2	Understand and apply tabulation method to simplify the boolean functions. Understand, analyze and design various combinational circuits.
CO3	Know the fundamentals of various flip flops and analyze and design sequential curcuits.
CO4	Understand various registers, design various counters. Design various PLD's for boolean functions.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-

UNIT-1 15 Periods

DIGITAL SYSTEMS AND BINARY NUMBERS: Digital System, Binary Numbers, Number base Conversions, Octal and Hexadecimal Numbers, Complements of Numbers, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic, Error Detection and Correction: 7 bit Hamming Code.

BOOLEAN ALGEBRA & LOGIC GATES: Introduction, 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.

GATE –LEVEL MINIMIZATION: Introduction, The map method, Four-variable K-Map, Product-of-Sums Simplification, Don't –Care Conditions, NAND and NOR implementation, Other Two level Implementations.

UNIT-2 15 Periods

MINIMIZATION: The Tabulation method, Determination of prime implicants, Selection ofprime-implicants.

COMBINATIONAL LOGIC: Introduction, Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adders - Subtractor, Decimal Adder, Magnitude Comparator, Decoders, Encoders, Multiplexers.

UNIT-3 15 Periods

SYNCHRONOUS SEQUENTIAL LOGIC: Introduction, Sequential Circuits, Storage Elements - Latches, Storage Elements -Flip Flops, Analysis of Clocked Sequential Circuits:State Equations, State Table, State Diagram, Flip Flop Input Equations, Analysis with D, JK and T Flip Flops; State reduction and Assignment, Design Procedure.	
UNIT-4	15 Periods
REGISTERS and COUNTERS: Registers, Shift registers, Ripple Counters, SynchronousCounters. MEMORY and PROGRAMMABLE LOGIC: Introduction, Random Access Memory: Read and Write Operations, Types of Memories; Read Only Memory, Programmable LogicDevices: PROM, PLA, PAL.	
Text Books :	1. M. Morris Mano, Michael D. Ciletti, "Digital Design", 5th Edition, Prentice Hall, 2013. 2. A. Anand Kumar, "fundamentals of digital circuits", 4th Edition, PHI.
References :	1. John F. Wakerly, "Digital Design: Principles and Practices", 4th Edition, Pearson, 2006. 2. Brian Holdsworth, Clive Woods, "Digital Logic Design", 4th Edition, Elsevier Publisher, 2002. 3. Donald E Givone, "digital principles and design", TMT.

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common for CSE, IT, ME branches)

I B. Tech. – II Semester (Code: 18EE001)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- To understand basic Laws in circuits, analysis of simple DC circuits, Theorems and its applications, fundamentals of AC circuits & its analysis and concepts of three phase balanced circuits
- To learn basic properties of magnetic materials and its applications.
- To understand working principle, construction, applications and performance of DC machines, AC machines.
- To learn basic concepts, working principal, characteristics and applications of semiconductor diode and transistor family.
- To gain knowledge about the static converters and regulators.
- To learn basic concepts of power transistors and operational amplifiers closer to practical applications.

Course Outcomes: At the end of the course students will be able to

CO1	Explain basic Laws in circuits, analysis of simple DC circuits, Theorems and its applications, fundamentals of AC circuits.
CO2	Compare basic properties of magnetic materials and applications.
CO3	Assess the working principle, construction, applications and performance of DC machines, AC machines.
CO4	Explain basic concepts, working principal, characteristics and applications of semiconductor diode and transistor family.
CO5	Differentiate the static converters and regulators.
CO6	Illustrate the Transistor family and Operational amplifiers.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	2	3	1	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO6	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-

UNIT-1 15 Periods

Electrical Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-2	15 Periods
Electrical Machines Magnetic materials, BH characteristics, Construction, working of DC machines, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction and working of synchronous generators.	
UNIT-3	15 Periods
Semiconductor Diodes and applications Semiconductor materials, semiconductor diode, Resistance levels, Diode equivalent circuits, Zener diode, Light emitting diode, Load line analysis, half wave rectification, Full wave rectification, Bridge rectifier, Use of capacitor filter in rectifier, Zener diode voltage regulator, Clippers, Clampers Bipolar Junction Transistors Transistor construction and operation, Common base configuration, Transistor amplifying action, Common emitter configuration, Common collector configuration, Limits of operation.DC load line and bias point, Voltage divider bias of transistor.	
UNIT-4	15 Periods
Field Effect Transistors Construction and characteristics of JFET and MOSFET Operational Amplifiers Introduction, Differential and common mode operation, OP-AMP Basics, Practical OP-AMP circuits: Inverting amplifier, Non inverting amplifier, Unity follower, summing amplifier, Integrator and differentiator	
Text Books :	1. S.K. Bhattacharya, "Basic Electrical and Electronics Engineering", PearsonPublications 2. Robert L. Boylestad & Louis Nashelsky, 'Electronic Devices and circuit theory', PHI Pvt.Limited, 11th edition 3. "Basics of Electrical and Electronics Engineering", Nagsarkar T K and Sukhija M S, Oxford press University Press.
References :	1. David A. Bell, 'Electronic Devices and Circuits', oxford publisher,5th edition 2. "Basic Electrical, Electronics and Computer Engineering", Muthusubramanian R, Salivahanan S and Muraleedharan K A, Tata McGraw Hill, Second Edition, (2006).

PROBLEM SOLVING USING PROGRAMMING
(Common for all branches except Civil Engineering)
I B.Tech – II Semester (Code:18CS001)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: BASIC MATHEMATICS

Course Objectives: Students will be able to

- Understand basic concepts of C Programming such as: C-tokens, Operators, Input/output, and Arithmetics.
- Develop problem-solving skills to translate 'English' described problems into programs written using C language.
- Use Conditional Branching, Looping, and Functions.
- Apply pointers for parameter passing, referencing and differencing and linking data structures.
- Manipulate variables and types to change the problem state, including numeric, character, array and pointer types, as well as the use of structures and unions, File.

Course Outcomes: At the end of the course students will be able to

CO1	Formulate simple algorithms for arithmetic and logical problems and remember the basics of computer fundamentals of computer history.
CO2	Translate the algorithms to programs also to test and execute the programs and correct syntax and logical errors and implementing conditional branching, iteration and recursion.
CO3	Analyze the problem for its decomposition into functions.
CO4	Understand the file handling and dynamic memory allocation using c programming language.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	3	3	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	3	3	3	-
CO3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	3	3	3	-

UNIT-1 15 Periods

Overview of C, Constants, Variables and Data Types, Operators and Expressions, ManagingI/O Operations. Decision Making and Branching.

Programming Exercises for Unit I: C-expressions for algebraic expressions, evaluation of arithmetic and Boolean expressions. Syntactic and logical errors in a given program, output of a given program, values of variables at the end of execution of a program fragment, Programs using Scientific and Engineering formulae. Finding the largest of the three given numbers. Computation of discount amount on different types of products with different discount percentages. Finding the class of an input character, finding the type of triangle formed with the given sides, computation of income-tax, finding given year is leap year or not, and conversion of lower case character to its upper case.

UNIT-2 15 Periods

Decision Making and Looping, Arrays, Character Arrays and Strings.
Programming Exercises for Unit II: To print the sum of the digits of a given number and to display the image of a given number. To find whether a given number is prime, printing Fibonacci sequence and to find prime factors of a given number. To print graphic patterns of symbols and numbers. To find the length of a string, compare strings, reverse a string, copy a string and to find whether the given string is palindrome or not with and without using String Handling Functions. Transpose of a matrix and sorting of names using arrays.

UNIT-3	15 Periods

User-defined Functions, Structures and Unions, Pointers
Programming Exercises for Unit - III: Functions - Recursive functions to find factorial &GCD (Greatest Common Divisor), string operations using pointers and pointer arithmetic. Swapping two variable values. Sorting a list of student records on register number using arrayof pointers

UNIT-4	15 Periods

File Management in C, Dynamic Memory Allocation, Preprocessor
Programming Exercises for Unit - IV: Operations on complex numbers, and to read an input file of marks and generate a result file, sorting a list of names using command line arguments.Copy the contents of one file to another file. Allocating memory to variables dynamically.

Text Books :	Programming in ANSI C by E.Balaguruswamy, Fifth Edition.
References :	1. Kernighan BW and Dennis Ritchie M, "C programming language", 2nded, Prentice Hall. 2. Yashavant P. Kanetkar, "Let us C", BPB Publications. 3. Herbert Schildt, "C: The Complete Reference", 4th edition, Tata Mcgraw-Hill. 4. Ashok N.Kamthane, "Programming in C", PEARSON 2nd Edition.

SEMICONDUCTOR PHYSICS LAB

I B.Tech – II Semester (Code: 18PHL01)

(COMMON TO ALL BRANCHES)

Lectures	:	3 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Basic experiments such as Magnetic Field Measurements, Hall Effect and LCR resonance give the knowledge to apply them in magnetic applications.
- The experiments CRO, Solar Cell, LASER diode provides the thorough understanding of OPTO Electronic devices useful in Engineering and Industrial applications.
- The measurements relating to various physical parameters of materials make the student to understand their utility, design and fabrication of several devices.

Course Outcomes: At the end of the course students will be able to

CO1	Acknowledge the important aspects of earth magnetic field, realize the use of Maxwells equations in various magnetic applications
CO2	Realization of material properties and parameters.
CO3	Get hands on experience in various opto-electronic devices like Solar Cell, Photo Cell and their applications.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	2	2	-	-	-	-	2	0	-	-	2	-	-
CO2	3	3	2	2	-	-	-	-	2	2	-	-	2	-	-
CO3	3	3	2	2	2	-	-	-	2	-	-	-	2	-	-

LIST OF EXPERIMENTS

1. Determination of acceleration due to gravity at a place using compound pendulum.
2. Study the variation of intensity of magnetic field along the axis of a circular coil using Stewart-Gee's apparatus.
3. Determination of thickness of thin wire using air wedge interference bands.
4. Determination of radius of uatue of a Plaooelesfoig Newton's rings.
5. Determination of wavelengths of mercury spectrum using grating normal incidence method.
6. Determination of dispersive power of a given material of prism using prism minimum deviation method.
7. Draw the resonant characteristic curves of L.C.R. series circuit and calculate the resonant frequency.
8. Draw the characteristic curves of a photocell and calculate the maximum velocity of electron.
9. Verify the laws of transverse vibration of stretched string using sonometer.
10. Determine the rigidity modulus of the given material of the wire using Torsional pendulum.
11. Draw the load characteristic curves of a solar cell.
12. Determination of Hall coefficient of a semiconductor.
13. Determination of voltage and frequency of an A.C. signal using C.R.O.
14. Determination of Forbidden energy gap of Si &Ge.
15. Determination of wavelength of laser source using Diode laser.

Any three experiments are virtual

Text Books :	1. Engineering physics laboratory manual 2. P.Srinivasarao & K.Muraldhar, Himalaya publications.

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

(Common for CSE, IT, ME branches)

I B.Tech – II Semester (Code: 18EEL01)

Lectures	:	3 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- To understand basic Laws in circuits, analysis of simple DC circuits, Theoremsand its applications, fundamentals of AC circuits & its analysis and concepts of three phase balanced circuits
- To learn basic properties of magnetic materials and its applications.
- To understand working principle, construction, applications and performance ofDC machines, AC machines.
- To learn basic concepts, working principal, characteristics and applications of semiconductor diode and transistor family.
- To gain knowledge about the static converters and regulators.
- To learn basic concepts of power transistors and operational amplifiers closer to practical applications.

Course Outcomes: At the end of the course students will be able to

CO1	Validate the basic network theorems such as KCL, KVL, superposition, Thevenin's and Norton's theorems.
CO2	Measure the parameters of choke coil.
CO3	Figure out the parameters, regulation, and efficiency of single-phase transformer.
CO4	Discriminate between the characteristics of PN junction diode, Zener diode and Transistor.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	1	3	-	-	-	-	3	2	-	-	3	-	-
CO2	3	3	1	3	-	-	-	-	3	2	-	-	3	-	-
CO3	3	3	1	3	-	-	-	-	3	2	-	-	3	-	-
CO4	3	3	1	3	-	-	-	-	3	2	-	-	3	-	-

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Verification of Thevenin's theorem
4. Verification of Norton's theorem
5. Parameters of choke coil
6. Measurement of low and medium resistance using volt ampere method
7. OC & SC test of single phase transformer
8. Load test on single phase transformer
9. V-I characteristics of PN junction Diode

10. V-I characteristics of Zener Diode
11. Characteristics of CE Configuration
12. Transfer and Drain Characteristics of JFET
13. Calculation of Ripple factor using Half wave rectifier
14. Calculation of Ripple factor using Full wave rectifier
15. Non linear wave shaping – clippers/clampers

Note: Minimum 10 experiments should be carried

PROBLEM SOLVING USING PROGRAMMING LAB

I B.Tech – II Semester (Code: 18CSL01)

Lectures	:	3 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand basic concepts of C Programming such as: C-tokens, Operators, Input/output, and Arithmetics.
- Develop problem-solving skills to translate 'English' described problems into programs written using C language.
- Use Conditional Branching, Looping, and Functions.
- Apply pointers for parameter passing, referencing and differencing and linking data structures.
- Manipulate variables and types to change the problem state, including numeric, character, array and pointer types, as well as the use of structures and unions, File.

Course Outcomes: At the end of the course students will be able to

CO1	Address the challenge, pick and analyze the appropriate data representation formats and algorithms.
CO2	Choose the best programming construct for the job at hand by comparing it to other structures and considering their constraints.
CO3	Develop the program on a computer, edit, compile, debug, correct, recompile and run it.
CO4	Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3

List of Programs

1. A program for electricity bill taking different categories of users, different slabs ineach category. (Using nested if-else statement).

Domestic Customer:		
Consumption Units	Rate of Charges (Rs.)	
0 – 200	0.50 per unit	
201 – 400	100 plus	0.65 per unit
401 – 600	230 plus	0.80 per unit
601 and above	390 plus	1.00 per unit
Commercial Customer:		
Consumption Units	Rate of Charges (Rs.)	
0 – 100	0.50 per unit	

101 – 200	50 plus	0.6 per unit
201 – 300	100 plus	0.70 per unit
301 and above	200 plus	1.00 per unit

2. Write a C program to evaluate the following (using loops):
   a) $1 + x^2/2! + x^4 / 4!+ \ldots$up to ten terms
   b) $x + x^3/3! + x^5/5!+ \ldots$ up to ten terms
3. Write a C program to check whether the given numbers
   a) Prime or not.
   b) Perfect or Abundant or Deficient.
4. Write a C program to display statistical parameters (using one – dimensional array).
   a) Mean
   b) Mode
   c) Median
   d) Variance.
5. WriteaCprogramtoreadalistofnumbersandperformthefollowingoperations
   a) Print the list.
   b) Delete duplicates from the list.
   c) Reverse the list.
6. Write a C program to read a list of numbers and search for a given number using Binary search algorithm and if found display its index otherwise display the message "Element not found in the List".
7. Write a C program to read two matrices and compute their sum and product.
8. Write a C program to read list of student names and perform the following operations
   a) To print the list of names.
   b) To sort them in ascending order.
   c) To print the list after sorting.
9. Write a C program that consists of recursive functions to
   a) Find factorial of a given number
   b) Solve towers of Hanoi with three towers (A, B & C) and three disks initiallyon tower A.
10. A Bookshop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book the sales person inputs the title and the author, and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed, if it is, then the system displays the book details and request for the number of copies required, if the requested copies are available the total cost of the requested copies is displayed otherwise the message "required copies not in stock" is displayed. Write a program for the above in structures with suitable functions.

11. Write a C program to read a data file of students' records with fields (Regno, Name, M1,M2,M3,M4,M5) and write the successful students data (percentage > 40%) to a data file.

12. Write a C program to read a file as command line argument and count the given word frequency in a file

PROBABILITY & STATISTICS

II B. Tech. – III Semester (Code: 18MA003)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Apply the continuous probability densities to various problems in science and engineering.
- Estimate the point and interval estimators of the mean, variance and proportion for the given Sample data and apply Z-test, t-test to various real-life problems
- Apply various sample tests like F-test and $\chi 2$ -test for decision making regarding the population based on sample data.
- Compute the level of correlation, the best fit curve to the given data by the method of least squares and also perform ANOVA arising in the field of engineering.

Course Outcomes: At the end of the course students will be able to

CO1	Understand various continuous probability density functions and apply them to various problems in science and engineering.
CO2	Estimate the point and interval estimators of the mean, variance and proportion for the given Sample data and apply Z-test and t-test to various real life problems
CO3	Apply various sample tests like F-test and $\chi 2$ -test for decision making regarding the population based on sample data and perform one way and two way analysis of variance to different realistic problems.
CO4	Compute the level of correlation, the linear relationship for the given bivariate data, the best fit curve to the given data by the method of least squares and perform multiple regression analysis to the regression model arising in the field of engineering.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	-	-	-	-	-	-	-	-	-	2	-	3	-
CO2	3	3	2	-	-	-	-	-	-	-	-	2	-	3	-
CO3	3	3	2	-	-	-	-	-	-	-	-	2	-	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	2	-	3	-

UNIT-1 — 15 Periods

Continuous Random Variables, Normal Distribution, Normal Approximation to the Binomial Distribution, Uniform Distribution, Gamma Distribution and its applications, Beta Distribution and its applications, Joint Distributions (Discrete),Joint Distributions (Continuous).Populations and Samples, Law of large numbers, Central limit theorem and its applications, The sampling distribution of the mean (σ unknown),The sampling distribution of the variance.
(Sections 5.1, 5.2, 5.3, 5.5,5.7, 5.8, 5.10, 6.1, 6.2, 6.3, 6.4 of Text Book [1])

UNIT-2 — 15 Periods

Point estimation, Interval estimation, Tests of Hypotheses, Null Hypothesis and Tests of Hypotheses, Hypothesis concerning one mean, Comparisons-Two independent Large samples, Comparisons-Two independent small samples, Paired sample t test.
(Sections 7.1,7.2, 7.4, 7.5, 7.6, 8.2, 8.3, 8.4 of Text Book [1])

UNIT-3	15 Periods
The Estimation of variances, Hypotheses concerning one variance, Hypotheses Concerning two variances, Estimation of proportions, Hypotheses concerning one proportion, Hypotheses concerning several proportions, Procedure for Analysis of Variance (ANOVA) for comparing the means of k (>2) groups- one way classification (Completely randomized designs), Procedure for Analysis of Variance (ANOVA) for comparing the means of k (>2) groups- two way classification (Randomized block designs). (Sections 9.1, 9.2, 9.3, 10.1, 10.2, 10.3, 12.2, 12.3 of Text Book [1])	
UNIT-4	15 Periods
Multivariate Analysis: The concept of bivariate relationship, scatter diagram, Pearson‟s correlation and correlation matrix. Simple linear regression model and assumptions, Least Squares Estimation of the parameters of the model, Testing the significance of the model. Regression versus Correlation, Multiple linear regression model with k explanatory variables and assumptions of the model. Least Square Estimation of regression coefficients. Concept of the coefficient of determination R^2. Test for significance of the regression model and individual regression coefficients. Applications of multiple regression analysis. (1^{st} and 2^{nd} Chapters of Text Book [2])1	
Text Books:	1. Miller & Freund‟s “Probability and Statistics for Engineers”, Richard A. Johnson, 8^{th} Edition, PHI. 2. Introduction to Linear Regression Analysis, Douglas C. Montgomery, E.A. Peck and G.G. Vining, 3^{rd} edition, Wiley.
References :	1. R.E Walpole, R.H. Myers & S.L. Myers, Probability & Statistics for Engineers and Scientists‟, 6^{th} Edition, PHI. 2. Fundamentals of Mathematical Statistics, S. C. Gupta and V.K.Kapoor, 11^{th} Edition, Sultan Chand & Sons. 3. Murray R Spiegel, John J. Schiller, R. Alu Srinivas Probability & Satistics‟,Schaum’s outline series. 4. K.V.S. Sarma, Statistics Made Simple – Do it yourself on PC‟, Prentice Hall India, Second Edition, 2015.

DATA STRUCTURES

II B. Tech. – III Semester (Code: 18CS302)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Analyse concepts of Abstract data type, data structure, performance measurement
- Time and Space complexities of algorithms.
- To develop the implementation of array list and linked lists.
- To learn the implementation linear data structures such as stacks, queues and their

Course Outcomes: At the end of the course students will be able to

CO1	Analyse the algorithms to determine the time & space complexity and manipulating data using array or list representation.
CO2	Implement the applications of Stack & Queue and analyze the various sorting techniques.
CO3	Build and put into practice several tree algorithms, such as the binary tree, BST, and AVL tree.
CO4	Apply several hashing methods and priority queues and analyze their performance.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-

UNIT-1 — 15 Periods

Algorithm Analysis: Mathematical Background, Model, what to Analyze, Running Time Calculations.

Lists: Abstract Data Types, The List ADT, Singly Linked List ADT, Doubly Linked List ADT, Circular Linked List ADT, Polynomial ADT: addition, multiplication operations.

UNIT-2 — 15 Periods

Stacks and Queues: The Stack ADT and its applications such as Infix to Postfix expression conversions, Evaluation of Postfix expressions. The Queue ADT, Queue Application-Radix sort.

Basic Sorting Techniques: Bubble sort, Selection sort, Insertion sort, Shell sort

UNIT-3 — 15 Periods

Trees: Preliminaries, Binary Trees, Expression trees, The Search Tree ADT, Binary Search Trees, Splay Trees, Implementations, AVL Trees-Single Rotations, Double rotations, Implementations.

UNIT-4 — 15 Periods

Hashing: General Idea, Hash Function, Separate Chaining, Open Addressing. Priority Queues (Heaps): Model, Simple implementations, Binary Heap, Heap Sort. Disjoint Set ADT: Dynamic equivalence problem, Basic Data Structure, Smart Union Algorithms, Path Compression.	
Text Books :	1. Mark Allen Weiss, "Data Structures and Algorithm Analysis inC", Second Edition, Pearson Education.
References :	1. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, "Data Structures Using C, Pearson Education Asia, 2004.Richard F.Gilberg, Behrouz A. Forouzan, "Data Structures – A 2. Pseudocode Approach with C", Thomson Brooks / COLE, 1998. Aho, J.E. Hopcroft and J.D. Ullman, "Data Structures andAlgorithms", Pearson Education Asia, 1983.

DISCRETE MATHEMATICS

II B. Tech. – III Semester (Code: 18CS302)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand operations on discrete structures such as sets, functions, relations, and Sequences. Formulate short proofs using the following methods: direct proof, indirect proof, and proof by contradiction, and case analysis etc. Apply algorithms and use definitions to solve problems to prove statements in elementary number theory. Construct mathematical arguments using logical connectives and quantifiers. Verify the correctness of an argument using propositional and predicate logic and truth tables.
- Understand to solve problems using counting techniques and combinatory in the context of discrete probability.
- Understand problems on involving recurrence relations and generating functions. And Know the properties of equivalence relations and partial orderings.
- Understand basic definitions and properties associated with simple planar graphs, including isomorphism, connectivity, and Euler's formula, and describe the difference between Eulerian and Hamiltonian graphs. Use graphs and trees as tools to visualize and simplify situations.

Course Outcomes: At the end of the course students will be able to

CO1	Recognize the fundamental ideas behind sets, relations, and functions.
CO2	Demonstrate the principles of inference used to support claims. Utilize a variety of counting strategies to solve computation-related issues.
CO3	Discuss different methods for solving the different types of recurrence relations.
CO4	Apply graph theory in solving computing problems.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	3	-

UNIT-1 15 Periods

Set Theory: Sets and subsets, Venn Diagrams, Operations on sets, laws of set theory, Power sets and products, Partition of sets, The principle of inclusion - Exclusion. Relations: Definition, Types of relation, Composition of relations, Domain and range of a relation, Representation of Relations, Operations of relation, Special properties of a binary relation, Equivalence Relations and Partial Ordering Relations , POSET diagram and lattice, Paths and Closures.

Functions: Definition and types of functions, Composition, Inverse and Identity of functions.

UNIT-2 15 Periods

Logic: Fundamentals of Logic, Logical Inferences, Methods of Proof of an implication, First order Logic & Other methods of proof, Rules of Inference for Quantified propositions, Mathematical Induction. Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumerating Combinations and Permutations with repetitions.	
UNIT-3	15 Periods
Recurrence relations: Generating functions of sequences, Calculating Coefficients of Generating Functions. Solving recurrence relations by Substitution and generating functions. The methods of characteristic roots, solutions of inhomogeneous recurrence relations.	
UNIT-4	15 Periods
Graphs: Basic concepts, Directed Graphs and Adjacency Matrices, Application: Topological Sorting. Isomorphism and Sub graphs, Planar Graphs, Euler's Formula; Multigraphs and EulerCircuits, Hamiltonian Graphs, Chromatic Numbers, The Four Color Problem.	
Text Books :	1. Toe L.Mott, Abraham Kandel& Theodore P.Baker, "Discrete Mathematics for Computer Scientists & Mathematicians", PHI 2nd edition.
References :	1. C.L. Liu, "Elements of Discrete Mathematics". 2. Rosen, "Discrete Mathematics".

OBJECT ORIENTED PROGRAMMING

II B. Tech. – III Semester (Code: 18CS304)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand advantages of OO programming over procedural oriented programming, learn the basics of variables, operators, control statements, arrays, strings, classes andobjects.
- Understand, write and implement Operator Overloading, Indexers, Properties, Inheritance, Interfaces, Structures, and Enumerations.
- Understand and write programs on Exception Handling, I/O, Delegates and Events.
- Understand Namespaces, the Preprocessor, Assemblies, Generics, Collections, Enumerators, and Iterators.

Course Outcomes: At the end of the course students will be able to

CO1	Demonstrate variables, conditional and iterative execution techniques, etc., and comprehend basic java language syntax and semantics.
CO2	Understand the concepts of Inheritance, Packages, Interfaces, Strings and Collections.
CO3	Explain the concepts of Exception Handling, Multithreading programming, and I/O.
CO4	Apply AWT and Swing concepts to demonstrate and develop GUI applications.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
CO2	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
CO3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
CO4	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3

UNIT-1 — 15 Periods

The History and Evolution of Java
An Overview of Java
Data Types, Variables and Arrays
Operators
Control Statements
Introducing Classes
A Closer Look at Methods and Classes

UNIT-2 — 15 Periods

Inheritance
Packages and Interfaces
Strings: String Constructors, Program using 10 String methods
String Buffer class, Program using 10 String Buffer methods Introducing StringBuilder class.
Type Wrappers, Auto boxing/unboxing.
Collections: Collections Overview, Names of Collection Interfaces, Classes. Programs using Collection classes LinkedList<String>, ArrayList<String>

UNIT-3 — 15 Periods

Exception Handling Multithreaded Programming I/O: I/O Basics, Reading Console Input, Writing Console Output, The Print Writer class, Reading and Writing Files, Automatically Closing a File	
UNIT-4	15 Periods
The Applet Class: Applet Architecture, An Applet Skeleton, Applet program to draw shapes, setting Color, Font using Graphics class. Event Handling: Introducing the AWT: Window Fundamentals, Program using AWT components Label, Text Field, Text Area, Checkbox, Checkbox Group, Button, Program using Flow Layout, Grid Layout, and Border Layout. GUI Programming with Swing: The Origins of Swing, Advantages of Swing over AWT, The MVC Connection, Program using Swing Components JLabel, JText Field, JText Area, JCheck box, JButton, JTabbed Pane, JTable, JTree, JCombo Box	
Text Books :	1. "Java The Complete Reference", 9th Edition, Herbert Schildt, TMH Publishing Company Ltd, New Delhi.
References :	

OPERATING SYSTEMS

II B. Tech. –III Semester (Code: 18CS305)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand different structures, services of the operating system and the use of scheduling and operations on process.
- Understand the use of scheduling, operations on process, the process scheduling Algorithms and synchronization concepts.
- Understand the concepts of deadlock, memory and virtual memory management techniques.
- Understand the concepts of File System, Input/output systems and system protection of various operating systems.

Course Outcomes: At the end of the course students will be able to

CO1	Analyze the structure of OS and basic architectural components involved in OS design.
CO2	Develop various process scheduling algorithms for a given specification of CPU utilization, throughput, TAT, WT & RT.
CO3	Articulate the causes and effects of deadlocks and comprehend memory management concepts, including virtual memory.
CO4	Design and implement various file allocation methods and Disk Scheduling Algorithms.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-		-	-		-	3	-	-

UNIT-1 — 15 Periods

Introduction: What OSs Do, Computer System Operation, Storage structure, OS Structure, OS Operations.

Operating-System Structures: OS Services, User and operating system Interface, System Calls, Types of System Calls, System Programs, OS Design and Implementation, OS Structure.

Processes: Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication.

Threads: Overview, Multicore Programming, Multithreading Models.

[Sections:1.1, 1.2.1, 1.2.2,1.4,1.5, 1.5.1,2.1, 2.2,2.3,2.4, 2.5, 2.6, 2.7,2.7.1,2.7.2,2.7.3,2.7.43.1, 3.2,3.3,3.4, 4.1,4.2,4.3]

UNIT-2 — 15 Periods

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms.
Process Synchronization: Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of Synchronization, Monitors.
[Sections : 5.1,5.2,,5.3,5.4,5.5,5.6,5.7,5.8, 6.1,6.2,6.3]

UNIT-3	15 Periods

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance, Detection and Recovery.
Main Memory: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table.
Virtual-Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Other Considerations.
[Sections; 7.1,7.2,7.3,7.4,7.5,7.6,7.7,8.1,8.2,8.3,8.4,8.5,8.6,9.1, 9.2,9.3,9.4,9.5,9.6,9.9]

UNIT-4	15 Periods

File System Interface: File concept, Access Methods, Directory and Disk Structure,
File System Implementation: File System Structures, Directory Implementation, Allocation Methods
Protection: Goals of Protection, Principles of Protection, Domain of Protection- Domain Structure, Access Matrix, Implementation of Access Matrix.
Mass Storage Structure: Over View, Disk Structure, Disk Scheduling, Disk Management, RAID levels
[Sections:10.1,10.2,10.4,10.5,10.7,11.1,11.2,11.3,11.5,12.1,12.3,12.4,14.1,14.2,14.3,14.3.1, 14.4,14.5]

Text Books :	1. Silberschatz & Galvin, "Operating System Concepts", 9th edition, John Wiley & Sons (Asia) Pvt.Ltd.
References :	1. William Stallings, "Operating Systems – Internals and Design Principles", 5/e,Pearson 2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", TataMcGraw Hill Co., 1998 edition 3. Andrew S.Tanenbaum, "Modern Operating Systems", 2nd edition, PHI

MICROPROCESSORS & MICROCONTROLLERS

II B. Tech. –III Semester (Code: 18CS306)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Learn the architecture and the instruction set of an Intel 8086 microprocessor.
- Develop the skills of programming and interfacing peripherals of microprocessors and microcontrollers.
- Analyse and design algorithms for solving problems in 8086 assembly language
- Understand the 8086 bus activities during the read and write cycles.

Course Outcomes: At the end of the course students will be able to

CO1	Acquire the knowledge of 8086 microprocessor's architecture.
CO2	Develop Assembly language programs using procedures and Macros.
CO3	Outline the 8086 Interrupt system and pin diagram.
CO4	Recognize and utilize the standard programming instructions of 8051 microcontrollers also peripherals and its interfacing with processors.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	-	-	-	2	-	-	-	-	-	-	-	3	-	-
CO3	-	-	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	-	2	-	2	-	-	-	-	-	-	-	3	-	-

UNIT-1 — 15 Periods

The 8086 Microprocessor Family, The 8086 Internal Architecture,
Introduction to Programming the 8086: 8086 Family Assembly Language Programming;Implementing standard Program Structures in 8086 Assembly language.

UNIT-2 — 15 Periods

Writing and Using Procedures: Introduction, The 8086 CALL and RET instructions,The 8086 Stack, A Near Procedure CALL and Example, Another Look at Stack Operation during CALL and RET, Using PUSH and POP to save register content, Passing Parameters to and from Procedures, Writing and debugging programs containing Procedures, Reentrant and Recursive
Procedures, Recursive Procedure example, Writing and Calling Far Procedures. Writing and Using Assembler Macros.

UNIT-3 — 15 Periods

8086 Interrupts and Interrupt Applications: 8086 Interrupts and Interrupts Responses.
8086 System Connections & Timing: The Basic 8086 Microcomputer System, 8086 Bus activities during the Read and Write Machine Cycles, 8086 pin Diagram. The 8086 String Instructions.

UNIT-4 — 15 Periods

Interfacing Peripherals and Applications: Interfacing the Microprocessor to the Keyboard, Alphanumeric displays, 8259 Priority Interrupt Controller, 8237 DMA Controller. The 8051 Microcontrollers – Assembly language Programming- JUMP, LOOP, CALL Instructions. Addressing Modes, Arithmetic, Logic, Single – bit instructions.	
Text Books :	1. Douglas V. Hall, "Microprocessors and Interfacing", Tata McGraw- Hill, Revised Second Edition
References :	1. Yu-cheng Liu, Glenn A. Gibson, "Microcomputer systems: The 8086/8088 Family architecture, Programming and Design", Second 2. Barry B. Brey, "The Intel Microprocessors, 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, PentiumPro Processor, Pentium II, Pentium III, Pentium IV, Architecture, Programming & Interfacing", Sixth Edition, Pearson Education Prentice Hall of India, 2002.

UNIX PROGRAMMING LAB

II B. Tech. –III Semester (Code: 18CSL301)

Lectures	:	3 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Organize and manipulate files and directories
- Use the vi text editor to create and modify files
- Use SED command for insertion, deletion, and search and replace (substitution).
- Understand pattern scanning and processing using AWK.
- Create structured shell programming which accept and use positional parameters and exported variables.
- Understand File management system calls to provide I/O support for storage device types and multiple users.

Course Outcomes: At the end of the course students will be able to

CO1	Understand the major components, architecture of UNIX operating system and commands related to UNIX os.
CO2	Understand SED, commands related to text processing and usage of AWK in scripting language.
CO3	Able to understand concepts related to shell programming.
CO4	Able to understand system calls related to file management.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	-	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	-	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	-	-	-	2	-	2	-	3	3	3	3

UNIT-1 12 Periods

Directory commands – pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent present and parent directories and their usage in relative path names. File related commands –Editing with vi, cat, mv, rm, cp , wc . File attributes and permissions and knowing them. The ls command with options. Changing file permissions: (chmod) the relative and absolute permissions changing methods. Recursively changing file permissions. Directory Permissions. Other Basic commands: cal, date, df, du, find, jobs, kill ,less and more, ps, set, wc, who.

LIST OF EXPERIMENTS

1. Obtain the following results (i) To print the name of operating system (ii) To print thelogin name (iii) To print the host name
2. Find out the users who are currently logged in and find the particular user too.
3. Display the calendar for (i) Jan 2000 (ii) Feb 1999 (iii) 9th month of the year 7
4. A.D (iv) For the current month (v) Current Date Day Abbreviation , MonthAbbreviation along with year
5. Display the time in 12-Hour and 24 Hour Notations.
6. Display the Current Date and Current Time.

7. Display the message “GOOD MORNING” in enlarged characters.
8. Display the name of your home directory.
9. Create a directory SAMPLE under your home directory.
10. Create a subdirectory by name TRIAL under SAMPLE.
11. Change to SAMPLE.
12. Change to your home directory.
13. Change from home directory to TRIAL by using absolute and relative pathname.
14. Remove directory TRIAL.
15. Create a directory TEST using absolute pathname.
16. Using a single command change from current directory to home directory.
17. Remove a directory using absolute pathname.
18. Create files my file and your file under Present Working Directory.
19. Display the files my file and your file.
20. Append more lines in the my file and your file files.
21. How will you create a hidden file?.
22. Copy myfile file to emp.
23. Write the command to create alias name for a file.
24. Move yourfile file to dept.
25. Copy emp file and dept file to TRIAL directory
26. Compare a file with itself.
27. Compare myfile file and emp file.

UNIT-2	12 Periods

The Stream editor(sed): Line addressing, multiple instructions, context addressing, writing selected lines to a file, text editing, substitution, basic regular expressions.
File Handling and Text Processing utilities: grep, egrep, fgrep.
AWK: sample awk filtering, splitting a line into fields, formatting output, variables and expressions, comparison operators, number processing, storing awk programs in a file, the BEGIN and END sections, Built in variables and arrays, control structures.

LIST OF EXPERIMENTS

1. A. Create the following file as sed.lab: unix is great os. unix is open source. unix is freeos. learn operating system. Unix linux which one you choose. (*Each sentence in a line*)

1. Replace ‘unix’ with ‘linux’.
2. Replace only the third (3rd) instance of ‘unix’ with ‘linux’.
3. Try sed ’s/unix/linux/g’ sed.lab.
4. Replace ‘unix’ with ‘linux’ but only on line 3.
5. Add a new line, ‘Actually Windows is best’ after the second line.

B.

1. Viewing a range of lines of a document
2. Viewing the entire file except a given range
3. Viewing non-consecutive lines and ranges
4. Replacing words or characters inside a range
5. Using regular expressions
6. Viewing lines containing with a given pattern
7. Inserting spaces in files
8. Performing two or more substitutions at once

C.

1. Design a command “wishme” that will great you “good morning”, ”good Afternoon”, according to current time.
2. Design a command “fags” thats will list the files and their ages, to date.
3. Design a command “word-freq” that will print the words and number of Occurrences of that word in the given text.

UNIT-3	12 Periods

Shell programming: shell, functions of shell, metacharacters, input redirections and output redirections, pipes, shell as a programming language, shell variables, predefined local variables, predefined environment variables, arithmetic and conditional expressions, control structures, positional parameters, passing command line arguments, built in shell commands, shell programs, functions and arrays.

LIST OF EXPERIMENTS

1.

A. Design a command "which" that prints the path of the command given asArgument

B. Design a command "filelist[-c <char>]" which prints all file names beginning with The charter specified as argument to the command ,if the position is not specified It should print allthe file names.

C. Design a command getline[-f <filename> -n <line number>] which prints the line number lineno in the file specified with -f option. If the line number is not specified it should list all the lines in the given file

D. Design a command monthly-file[-m <month>] which list the files created in a given month where month is argument to be command. If the options is not specified it list the filesin all the months.

2.

A. Design a command list lines[-f <file name> -v <varname>] which prints the line from the given file file name ,which containing the variable varname.if arname Is not specified it should list ,all the lines.

B. Design a command avg[-n <colon> -f <file name>] which prints the average of the given column in a file where colon and file name are arguments to the commands

UNIT-4	12 Periods

File management System calls: Regular File management system calls: open(), read(), write(), lseek(), close(), unlink(), stat(), getdents().

LIST OF EXPERIMENTS

1. Write a C program to copy data from source file to destination file, where the file names areprovided as command-line arguments.
2. Write a C program that reads every 100th byte from the file, where the file name is given ascommand-line argument.
3. Write a C program to display information of a given file which determines the type of file and inode information, where the file name is given as command-line arguments.

Text Books:	1. UNIX Concepts and Applications, Sumitabha Das, 4th edition, TATA McGraw Hill. 2.UNIX for programmers and users", 3rd edition, Graham Glass, King Ables, Pearson education.
References :	1. "The Design of UNIX operating System", Maurice J.Bach, PHI. 2. "Advanced programming in the UNIX environment", W Richard Stevens, 2nd Edition, Pearson education. 3. "UNIX programming environment", Kernighan and pike, Pearson Education. 4. "Your UNIX the ultimate guide, Sumitabha Das, TMH, 2nd edition. 5. "Advanced UNIX programming", Marc J. Rochkind, 2nd edition, Pearson Education.

DATA STRUCTURES LAB

II B. Tech. – III Semester (Code: 18CSL302)

Lectures	:	3 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand and program basic data structures like arrays and linked lists with their applications.
- Understand and Program data structures like stacks and queues with their applications. Understand and implement sorting algorithms.
- Understand and program on trees, binary trees, binary search trees, avl trees, expression trees and their traversal methods.
- Understand and program on priority queues, hashing and their mechanisms. Basic knowledge of graphs representations and traversing methods.

Course Outcomes: At the end of the course students will be able to

CO1	Recognize Big O notation, data types, algorithms, and dynamic memory management.
CO2	Recognize fundamental data structures like queues, stacks, linked lists, and arrays.
CO3	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.
CO4	Fix the issue with the trees, piles, and Describe the collision concepts, hash function, and techniques for resolution.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3

LIST OF EXPERIMENTS

1. Write a program to perform the following operations on Array List 1.Creation, 2.Insertion, 3.Deletion, 4.Search, 5.Display.
2. Write a program that reads two lists of elements, prints them, reverses them, prints the reverse list, sort the lists, print the sorted lists, merges the list, prints merge list using array list.
3. Write a program to perform the following operations on Single Linked List.a). Creation b).Insertion c).Deletion d).Search e).Display.
4. Write a program to perform the following operations on Doubly Linked List.a). Creation b).Insertion c).Deletion d).Search e).Display.
5. Write a program to perform addition and multiplication of two polynomials using single Linked List.
6. Write a program to convert the given infix expression into postfix expression using stack.
7. Write a program to evaluate the postfix expression using stack.
8. Write a program that performs Radix sort on a given set of elements using queue.
9. Write a program to read n numbers in an array. Redisplay the arraylist withelements being sorted in ascending order using the following techniques (a) Bubble Sort (b) Selection Sort (c) Insertion Sort (d) Shell Sort.

10. Write a program to demonstrate Binary Expression tree.
11. Write a program to perform Binary Search tree operations and traversals.
12. Write a program to implement AVL tree that interactively allows (a) Insertion (b) Deletion (c) Find_min (d) Find_max.
13. Write a program to read n numbers in an array. Redisplay the arraylist withelements being sorted in ascending order using Heap Sort.
14. Write a program to find an element using Open Addressing.
15. Write a program to perform the following operations on Disjoint Set. a). Make-Set b). Find-Set c). Union.

Text Books :	1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education
References :	1. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, "Data Structures Using C", Pearson Education Asia, 2004. 2. Richard F.Gilberg, Behrouz A. Forouzan, "Data Structures – A PseudocodeApproach with C", ThomsonBrooks / COLE, 1998.

OBJECT ORIENTED PROGRAMMING LAB

II B.Tech –III Semester (Code: 18CSL303)

Lectures	:	3 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Write and implement programs using variables, operators, control statements, arrays, strings, classes and objects.
- Write and implement programs on Operator Overloading, Indexers, Properties, Inheritance, Interfaces, Structures, and Enumerations.
- Understand and write programs on Exception Handling, I/O, Delegates and Events.
- Write programs on Namespaces, Preprocessors, Assemblies, Generics, Collections,Enumerators, and Iterators.

Course Outcomes: At the end of the course students will be able to

CO1	Implement OOP concepts using its advantages over structured programming.
CO2	Develop and implement inheritance, polymorphism.
CO3	Analyze Exception Handling, Multithreading, I/O.
CO4	Create code for Event Handling, Applets, AWT and Swings.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	2	-	2		3	3	3	3
CO2	3	3	3	-	3	-	-	2	-	2		3	3	3	3
CO3	3	3	3	-	3	-	-	2	-	2		3	3	3	3
CO4	3	3	3	-	3	-	-	2	-	2		3	3	3	3

LIST OF EXPERIMENTS

1. Write a Java program to declare, initialize and accessing the elements of Single dimensional Arrays, Multidimensional Arrays.
2. Write a Java program to demonstrate recursion.
3. Write a Java program to demonstrate static member, static method and static block.
4. Write a Java program to demonstrate method overloading and method overriding using simple inheritance.
5. Write a Java program to demonstrate multiple inheritance using interfaces.
6. Write a Java program to demonstrate packages.
7. Write a Java program to demonstrate String class methods.
8. Write a Java program to create user defined exception class, use couple of built-in Exception classes.
9. Write a Java program to demonstrate inter-thread communication.
10. Write an Applet program passing parameters to Applet, using Graphics, Color andFont classes.
11. Write a Java program to demonstrate handling Action events, Item events, Keyevents, Mouse events, Mouse Motion events.
12. Write a GUI application which uses AWT components Label, Text Field, Text Area, Checkbox, Checkbox Group, Button.

Write a GUI application using JTable, JTree, JCombo Box.

Text Books :	1. “Java The Complete Reference”, 9th Edition, Herbert Schildt, TMH Publishing Company Ltd, New Delhi.

OPERATIONS RESEARCH

(Common for all branches)

II B. Tech. –IV Semester(Code: 18MA005)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- To derive the best and most economical solution to the given LPP within all of it's limitations in the fields of Engineering, Agricultural and manufacturing etc.
- To apply these techniques constructively to make effective decisions in various competitive game fields.
- To impart the knowledge of Operations Research in the concepts of Integer Programming and Dynamic Programming Problems.
- To understand various mathematical models of Queuing systems used in Operations Research.

Course Outcomes: At the end of the course students will be able to

CO1	Understand the basic concepts of optimization, Linear programming and solve the LPP's using graphical method, simplex method and big-M method.
CO2	Learn how to recognize and model strategic situations for any game, to predict when and how their action will have an influence on others and exploit strategic situations for the benefit of their own.
CO3	Solve all integer programming problems by Gomory cutting plane method and able to apply dynamic programming algorithm to solve a given problem.
CO4	Evaluate the performance of a queuing system and can make performance analysis by understanding basic concepts of queuing theory.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	2	-	2	-
CO2	3	3	3	-	-	-	-	-	-	-	-	2	-	2	-
CO3	3	3	3	-	-	-	-	-	-	-	-	2	-	2	-
CO4	3	3	3	-	-	-	-	-	-	-	-	2	-	2	-

UNIT-1 15 Periods

LINEAR PROGRAMMING PROBLEM-GRAPHICAL METHOD:
Introduction; Graphical Solution Method; Some exception cases; General Linear Programming Problem; Canonical and Standard Forms of L.P.P;

LINER PROGRAMMING-SIMPLEX METHOD: Introduction, Fundamental Properties of Solutions (without proofs);the Computations Procedure, Use of Artificial Variables (Big-M method), Degeneracy in Linear Programming.

[Sections:3.1; 3.2; 3.3; 3.4; 3.5; 4.1; 4.2; 4.3; 4.4; 4;5]

UNIT-2 15 Periods

GAMES AND STRATEGIES: Introduction; Two-person Zero –Sum Games; Some Basic terms; The Maximin-Minimax Principle; Games Without Saddle Points-Mixed Strategies; Graphic Solution of 2xn and mx2 games; Dominance Property.

[Sections:17.1; 17.2; 17.3; 17.4; 17.4; 17.6; 17.7]

UNIT-3	15 Periods
INTEGER PROGRMMING PROBBLEM: Introduction; Pure and Mixed Integer Programming Problem; Gomory's All-Integer Programming Problem Method; Construction of Gomory's Constraints; Fractional Cut Method-All integer LPP; Branch and Bound Method. **DYNAMIC PROGRAMMING**: Introduction; the Recursive Equation Approach; Characteristics of Dynamic Programming; Dynamic Programming Algorithm. [Sections:7.1; 7.2; 7.3; 7.4; 7.5; 7.7; 13.1; 13.2; 13.3; 13.4]	
UNIT-4	15 Periods
QUEUING THEORY: Introduction; Queuing System; Elements of a Queuing System; Operating Characteristic of a Queuing System; Deterministic Queuing System; Probability Distributions in Queuing System; Classifications of Queuing Models; Definition of Transient and Steady States; Poisson Queuing Systems: Model-I(M/M/I): (∞/FIFO),Model-II(M/M/I):(∞/SIRO),Model-III(M/M/I):(N/FIFO),Model-IV(Generalized Model: Birth-Death Process). [Sections: 21.1; 21.2; 21.3; 21.4; 21.5; 21.6; 21.7; 21.8; 21.9]	
Text Books :	1. Kanthi Swarup, P.K Gupta & Man Mohan, 'Operations Research' Sultan Chand & Sons, New Delhi,13th Edition,2007.
References :	1. SD.Sharma, "Operations Research", Kedarnath, Ramnath &Co., 2. Hamdy A.*Taha*, *Operations Research*: An introduction, PearsonPrentice Hall, New Jersey.

WEB TECHNOLOGIES

II B.Tech – IV Semester (Code: 18CS402)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Know elements and tags of HTML and apply Styles using Cascading Style Sheets.
- Know basics of Java Script, Functions, Events, Objects and Working with browser objects.
- Know basics of XML, DOM and advanced features of XML
- To convert XML documents into other formats and XSLT.

Course Outcomes: At the end of the course students will be able to

CO1	Create HTML document using appropriate tags to structure content.
CO2	Analyze the structure of web page and asses the use of display values for layout and evaluate the usability of an interactive element on a web page.
CO3	Create a dynamic web pager that utilizes browser objects and DOM interfaces to create, modify and remove elements and attributes in an HTML.
CO4	Develop HTML documents based on specific DTD (or) XML schema definitions and XSLT style sheets to transform XML data into different formats.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	-	3	-	3	-	-	-	-	-	-	3	3	-	3
CO2	3	-	3	-	3	-	-	-	-	-	-	3	3	-	3
CO3	3	-	3	-	3	-	-	-	-	-	-	3	3	-	3
CO4	3	-	3	-	3	-	-	-	-	-	-	3	3	-	3

UNIT-1 — 15 Periods

HTML5: Fundamentals of HTML, Working with Text, Organizing Text in HTML, Working with Links and URLs, Creating Tables, Working with Images, Colors, and Canvas, Working with Forms.

UNIT-2 — 15 Periods

CSS: Overview of CSS, Backgrounds and Color Gradients in CSS, Fonts and Text Styles, Creating Boxes and Columns Using CSS, Displaying, Positioning, and Floating an Element, List Styles, Table Layouts.

Dynamic HTML: Overview of JavaScript, JavaScript Functions, Events, Image Maps, and Animations.

UNIT-3 — 15 Periods

Dynamic HTML (Cont..):JavaScript Objects, Working with Browser Objects, Working withDocument Object.

Document Object Model: Understanding DOM Nodes, Understanding DOM Levels, Understanding DOM Interfaces- Node, Document, Element, Attribute.

UNIT-4 — 15 Periods

XML: Working with Basics of XML, Implementing Advanced Features of XML, Working with XSLT. AJAX: Overview of AJAX, Asynchronous Data Transfer with XML Http Request, Implementing AJAX Frameworks, Working with jQuery.	
Text Books :	1. Kogent Learning Solutions Inc., HTML5 BlackBook: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and Jquery
References :	1. HarveyM.DeitelandPaulJ. Deitel,"Internet &World Wide Web How toProgram",4/e,Pearson Education. 2. Jason Cranford Teague, "Visual Quick Start Guide CSS, DHTML&AJAX",4e,Pearson Education. 3. Tom Nerino Doli smith,"Java Script& AJAX for the web", Pearson Education2007. 4. Joshua Elchorn,"Understanding AJAX",PrenticeHall2006.

DATABASE MANAGEMENT SYSTEM
II B.Tech – IV Semester(Code:18CS403)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Familiarize with fundamental concepts of database and various database architectures and Design relations for Relational databases using conceptual data modeling.
- Implement formal relational operations in relational algebra and SQL.
- Identify the Indexing types and normalization process for relational databases
- Use mechanisms for the development of multi user database applications.

Course Outcomes: At the end of the course students will be able to

CO1	Use database design approach knowledge that provides a solid formal foundation for the relational data model and Utilizing the ER Model, comprehend and put data modeling principles into practice.
CO2	Create relational algebra expressions, relational calculus, and SQL for queries and be familiar with relational database theory.
CO3	Design database schema and Identify and solve the redundancy problem in database tables using normalization.
CO4	Recognize strategies for recovery, concurrency control, and transaction processing.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	3	2
CO2	3	3	3	3	3	-	-	-	-	-	-	-	3	3	2
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	3	2
CO4	3	3	3	3	-	-	-	-	-	-	-	-	3	3	2

UNIT-1 15 Periods

Databases and Database Users: Introduction - An Example - Characteristics of the Database Approach–Actors on the Scene- Workers behind the Scene-Advantages of Using the DBMS Approach.

Database System Concepts and Architecture: Data Models, Schemas, and Instances- Three-Schema Architecture and Data Independence- Database Languages and Interfaces- The Database System Environment -Centralized and Client/Server Architectures for DBMSs.

Data Modeling Using the Entity-Relationship(ER)Model: Using High-Level Conceptual Data Models for Database Design-An Example Database Application-Entity Types, Entity Sets, Attributes, and Keys-Relationship Types, Relationship Sets, Roles, and StructuralConstraints-Weak Entity Types-Refining the ER Design for the COMPANY Database-ER Diagrams, Naming Conventions, and Design Issues

UNIT-2 15 Periods

The Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT -Relational Algebra Operations from Set Theory-Binary Relational Operations: JOINand DIVISION–Additional Relational Operations-The Tuple Relational Calculus-The Domain Relational Calculus Schema Definition, Constraints, Queries, and Views: SQL Data Definition and Data Types –Specifying Constraints in SQL-Schema Change Statements in SQL-Basic Queries in SQL – More Complex SQL Queries-INSERT, DELETE, and UPDATE Statements in SQL- Views (VirtualTables) in SQL
UNIT-3 15 Periods
The Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT -Relational Algebra Operations from Set Theory-Binary Relational Operations: JOIN and DIVISION–Additional Relational Operations-The Tuple Relational Calculus-The Domain Relational Calculus Schema Definition, Constraints, Queries, and Views: SQL Data Definition and Data Types –Specifying Constraints in SQL-Schema Change Statements in SQL-Basic Queries in SQL – More Complex SQL Queries-INSERT, DELETE, and UPDATE Statements in SQL- Views (VirtualTables) in SQL
UNIT-4 15 Periods
Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing-Transaction and System Concepts-Desirable Properties of Transactions-Characterizing Schedules Based on Recoverability –Characterizing Schedules Based on Serializability Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control –Concurrency Control Based on Time stamp Ordering– Multi version Concurrency ControlTechniques- Validation(Optimistic) Concurrency Control Techniques-Granularity of Data Itemsand Multiple Granularity Locking Database Recovery Techniques: Recovery Concepts-Recovery Techniques Based on Deferred Update - Recovery Techniques Based on Immediate Update-Shadow Paging

Text Books :	1. Fundamentals of Database Systems, Ramez Elmasri and Navathe Pearson Education, 6thedition
References :	1. Introduction to Database Systems, C.J. Date Pearson Education 2. Database Management Systems, Raghu Rama krishnan, JohannesGehrke, TATA McGraw Hill3rdEdition 3. Database System Concepts, Silberschatz, Korth, McGraw hill,5thedition

COMPUTER ORGANIZATION

I B.Tech –IV Semester (Code: 18CS404)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the basic structure, operation of a digital computer, machine instruction and programs.
- Understand the execution of instructions, Hardwired control and Micro programmed control unit design.
- Understand basic computer arithmetic algorithms and operations.
- Understand the hierarchical memory system including cache memories and virtual memory. Identify where, when and how enhancements of computer performance can be accomplished

Course Outcomes: At the end of the course students will be able to

CO1	Understand the basic structure of computer and analyzing the concepts of machine instructions.
CO2	Illustrate the various arithmetic operation and learn about basic processing time.
CO3	Review the basic computer instruction set and create flowcharts for the arithmetic operations.
CO4	Recognize the I/O and memory organizations.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	-	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	-	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	2	-	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	2	-	2	-	-	-	-	-	-	-	-	-	3	-	-

UNIT-1 15 Periods

DATA REPRESENTATION: Data Types, Complements, Fixed-Point Representation, Floating- Point Representation, Other Binary Codes.

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro Operations, LogicMicro operations, Shift Micro Operations, Arithmetic Logic Shift Unit.

UNIT-2 15 Periods

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-ReferenceInstructions, Input-Output and Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.

MICROPROGRAMMED CONTROL: Control Memory, Address Sequencing, Microprogram Example, Design of Control Unit.

UNIT-3 15 Periods

CENTRAL PROCESSING UNIT: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer. COMPUTER ARITHMETIC: Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.	
UNIT-4	15 Periods
THE MEMORY SYSTEM: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware. INPUT-OUTPUT ORGANIZATION: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor	
Text Books :	1. Computer System Architecture, M.Morris Mano, 3rdEdition, Pearson/PHI. 2. Structured Computer Organization – Andrew S. Tanenbaum, 4thEdition, PHI/Pearson. 3. Fundamentals of Computer Organization and Design, Sivarama Dandamudi, Springer International Edition.

TECHNICAL ENGLISH

I B.Tech –IV Semester (Code: 18EL002)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- At enhancing the vocabulary competency of the students
- To enhance the understanding of the elements of grammar
- To enable the students to use proper spelling, grammar in constructing the sentences
- To enhance the learner's ability to communicate accurately

Course Outcomes: At the end of the course students will be able to

CO1	Make use of contextual clues to infer meanings of unfamiliar words from context.
CO2	Understand how to apply technical information and knowledge in practical documents for a variety of purposes.
CO3	Analyse the content of the text in writing use grammatical, stylistic, and mechanical formats and conventions appropriate to various audiences and disciplines.
CO4	Build confidence to participate actively in writing activities (individually and in collaboration) that model effective technical communication in the workplace.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	-	-	-	2	2	3	2	2	-	2	-
CO2	-	-	-	-	-	-	-	2	2	3	2	2	-	2	-
CO3	-	-	-	-	-	-	-	2	2	3	2	2	-	2	-
CO4	-	-	-	-	-	-	-	2	2	3	2	2	-	2	-

UNIT-1 15 Periods

1.1 Vocabulary Development: Familiarizing Idioms &Phrases
1.2 Grammar for Academic Writing: Making Requests
1.3 Language Development: Using Transition & Link words
1.4 Technical Writing: Letter Writing &Email Writing

UNIT-2 15 Periods

2.1 Vocabulary Development: Analogous words, Gender Sensitive language
2.2 Grammar for Academic Writing: Tenses: Simple Past /Present Perfect, The Future: Predicting &Proposing
2.3 Language Development: Cloze tests
2.4 Technical Writing: Technical Reports

UNIT-3 15 Periods

3.1 Vocabulary Development: Abbreviations &Acronyms
3.2 Grammar for Academic Writing: Describing(People/Things/Circumstances) : Adjectival &Adverbial groups
3.3 Language Development: Transcoding (Channel conversion from chart to text)
3.4 Technical Writing: Circular, Memos, Minutes of Meeting

UNIT-4	15 Periods
4.1 Vocabulary Development: Corporate vocabulary 4.2 Grammar for Academic Writing: Inversions &Emphasis 4.3 Language Development: Reading Comprehension 4.4 Technical Writing: Resume Preparation	
References :	1. Communication Skills, Sanjay Kumar & Pushpa Latha. Oxford UniversityPress:2011. 2. Technical Communication Principles and Practice. Oxford UniversityPress:2014. 3. Advanced Language Practice, Michael Vince. Macmillan Publishers:2003. 4. Objective English (Third Edition), Edgar Thorpe & Showick. Pearson Education:2009 5. English Grammar: A University Course (Second Edition), Angela Downing Philip Locke, Routledge Taylor & Francis Group 2016

DESIGN AND ANALYSIS OF ALGORITHMS

II B.Tech – IV Semester (Code:18CS406)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand about designing and effectiveness of an algorithm, and divide and conquer method.
- Know the optimal solution finding with the greedy and dynamic programming method.
- Easy know the major graph algorithms and their analyses, and backtracking information.
- Get the ability to branch with bound value and NP problems.

Course Outcomes: At the end of the course students will be able to

CO1	Analyze the performance of algorithms through various strategies and apply the Master theorem to estimate the complexity of divide-and-conquer algorithms.
CO2	Apply the divide-and-conquer and greedy techniques to solve problems and perform complexity analysis.
CO3	Articulate on graph problems and identify the applicability of the dynamic-programming paradigm for designing solutions to problems.
CO4	Utilize the Backtracking and Branch and Bound algorithms, find every potential solution to the combinatorial and optimixation issues. In addition, classify the P and NP complicated problems.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	3	3	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	3	3	3	-
CO3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	3	3	3	-

UNIT-1 15 Periods

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation-Bigoh-notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis. Master Theorem: Introduction, Generic Form- Case1, Case2, Case3, Inadmissible equations, Application to common algorithms.

UNIT-2 15 Periods

Divide and conquer: General method, applications-Quicksort, Merge sort, Stassen's matrix multiplication.

Greedy method: General method, applications-Job sequencing with deadlines, Fractional knapsack problem, Minimum cost spanning trees-Prims, Kruskal, Single source shortest path problem- Dijkstra.

UNIT-3 15 Periods

Dynamic Programming: General method, applications-0/1 knapsack problem, Travelling salesperson problem, Longest common sequence algorithm, Multi stage graphs using Forward& Backward approach, Reliability design. Graph Applications: Graph traversals – Depth first, Breadth first, Bio Connected Components, Strongly Connected Components.	
UNIT-4	15 Periods
Backtracking: General method, applications-n-queen problem, sum of subsets problem. Branch and Bound: General method, applications- 0/1 knapsack problem-LC Branch and Bound solution. NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP-Hardand NP Complete classes, Cook's theorem.	
Text Books :	1. E. Horowitz, S.Sahniand, S. Rajasekaran," Fundamentals of Computer Algorithms",Galgotia Publication.
References :	1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction ofComputer Algorithm", PHI. 2. Sara Basse, A.V.Gelder, "Computer Algorithms",Addison Wesley.

PYTHON PROGRAMMING LAB

II B.Tech–IV Semester(Code: 18CSL41)

Lectures	:	Periods (2T+3P)	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand and write code using the basics of Python, Statements, Expressions, Conditional Executions, and Functions.
- Write code for Iteration, Strings, File I/O.
- Write code in creating, usage of Lists, Dictionaries, and Tuples.
- Understand the concept of Object Orientation database and write code implementing them.

Course Outcomes: At the end of the course students will be able to

CO1	Identify the basic python constructs with a view of using them in problem solving.
CO2	Explore the usability of functions and strings in modular programming.
CO3	Apply lists, dictionaries, tuples and file operations to organize the data in real world problems.
CO4	Implement the problems in terms of real world objects using object oriented and database concepts.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3

Introduction: Overview, History of Python, Python Features, Environment Setup. Variables, expressions, and statements: values and types, variables, names and keywords, statements, operators and operands, expressions, order of operations, modulus operator, string operations, asking the user for input, comments, choosing mnemonic variable names.

Conditional execution: Boolean expressions, logical operators, conditional execution, Alternative execution, chained conditionals, nested conditionals, catching exceptions using tryand except, short-circuit evaluation of logical expressions.

Functions: function calls, built-in functions, type conversion functions, random numbers, math functions, adding new functions, definitions and uses, flow of execution, parameters and arguments, fruitful functions and void functions.

Iteration: updating variables, the while statement, infinite loops and break, finishing iterations with continue, definite loops using for, loop patterns.

Strings: string is a sequence, getting the length of a string using len, traversal through a string with a loop, string slices, strings are immutable, looping and counting, the in operator, string comparison, string methods, parsing strings, format operator.

Files I/O:persistence, opening files, text files and lines, reading files, searching through a file, letting the user choose the file name, using try except and open, writing files.

Lists: a list is a sequence, lists are mutable, traversing, operations, slices, methods, deleting elements, functions, strings, parsing lines, objects and values, aliasing, arguments.

Dictionaries: dictionary as a set of counters, dictionaries and files, looping and dictionaries, advanced text parsing.

Tuples: tuples are immutable, comparing tuples, tuple assignment, dictionaries and tuples, multiple assignment with dictionaries, the most common words, using tuples as keys in dictionaries, sequences.

Object-Oriented Programming: Managing Larger Programs, Using Objects, starting with Programs, Subdividing a Problem–Encapsulation, First Python Object, Classes as Types, Object Lifecycle, Many Instances, Inheritance.

Using Databases and SQL: Database concepts, Database Browser for SQLite, creating a database table, Structured Query Language summary, Basic data modeling, Programming with multiple tables, three kinds of keys, Using JOIN to retrieve data.

LIST OF EXPERIMENTS

1. Write a python program to check if the number is positive or negative or zero and displayan appropriate message.
2. Write a python program to take a string from user and count number of vowelspresent and percentage of vowels in it.
3. Write a python program to find the most frequent words in a text file.
4. Write a Python Program to Find the Sum of first n Natural Numbers.
5. Write a python program to find those number which are divisible by 7 and multiple of 5between 1500 and 2700.
6. Write a Python Program to Solve Quadratic Equation.
7. Create a program that ask the user for a number and then prints out a list of all the divisorsof that number.
8. Write a Python Program to Find HCF or GCD.
9. Write a Python Program to Find LCM.
10. Write a Python program to construct the following pattern, using a nested loop number.1
    22
    333
    4444
    55555
    666666
11. Write a Python Program to Sort Words in Alphabetic Order.
12. Write a Python function to create the HTML string with tags around the word(s).
13. Write a Python program to reverse words in a string.
14. Write a Python program to strip a set of characters from a string.
15. Write a python function to find the maximum and minimum of a list of numbers.
16. Write a Python Program to Find the Square Root.
17. Write a Python Program to Convert Decimal to Binary Using Recursion.
18. Write a python recursive function to a find the factorial of a given number.
19. Write a python program to find the longest word in each line of given file.
20. Write a Python program to combine each line from first file with the corresponding line insecond file.
21. Write a Python program to read a random line from a file.
22. Write a Python program to create a list by concatenating a given list which range goesfrom 1 to n.
    Sample list : ['p', 'q'] n =5
    Sample Output : ['p1', 'q1', 'p2', 'q2', 'p3', 'q3', 'p4', 'q4', 'p5', 'q5']
23. Write a Python program to split a list every Nth element.
    Sample list: ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j', 'k', 'l', 'm', 'n']
    Expected Output: [['a', 'd', 'g', 'j', 'm'], ['b', 'e', 'h', 'k', 'n'], ['c', 'f', 'i', 'l']]
24. Write a Python program to compute the similarity between two lists.
    Sample data: ["red", "orange", "green", "blue", "white"], ["black", "yellow", "green", "blue"]
    Expected Output:

Color1-Color2: ['white', 'orange', 'red']
Color2-Color1: ['black', 'yellow']

25 Write a Python program to replace the last element in a list with another list.
Sample data: [1, 3, 5, 7, 9, 10], [2, 4, 6, 8]
Expected Output: [1, 3, 5, 7, 9, 2, 4, 6, 8]

26 Write a Python program to find the repeated items of a tuple.

27 Write a Python program to convert a list with duplicates to a tuple without duplicates.

28 Write a Python program to reverse the elements of a tuple.

29 Write a Python program to replace last value of tuples in a list.
Sample list: [(10, 20, 40), (40, 50, 60), (70, 80, 90)]
Expected Output: [(10, 20, 100), (40, 50, 100), (70, 80, 100)]

30 Write a python program to find the most frequent words in a text file.

31 Write a Python program to combine two dictionary adding values for common keys.
d1 = {'a': 100, 'b': 200, 'c':300}
d2 = {'a': 300, 'b': 200, 'd':400}
Sample output: Counter({'a': 400, 'b': 400, 'd': 400, 'c': 300})

32 Write a Python program to print all unique values in a dictionary.
SampleData :[{"V":"S001"}, {"V": "S002"}, {"VI": "S001"},
{"VI": "S005"}, {"VII":"S005"}, {"V":"S009"},{"VIII":"S007"}]
Expected Output : Unique Values: {'S005', 'S002', 'S007', 'S001', 'S009'}

33 Write a Python program to create and display all combinations of letters, selecting each letter from a different key in a dictionary.
Sample data : {'1':['a','b'], '2':['c','d']}
Expected Output: ac ad bc bd

34 Write a Python program to get the top three items in a shop.
Sample data: {'item1': 45.50, 'item2':35, 'item3': 41.30, 'item4':55, 'item5':
Expected Output:
item4 55
item1 45.5
item3 41.3

35 Write a Python program to match key values in two dictionaries.
Sample dictionary: {'key1': 1, 'key2': 3, 'key3': 2}, {'key1': 1, 'key2':2}
Expected output: key1: 1 is present in both x and y

36 Write a Python class named Rectangle constructed by a length and width and a method which will compute the area of a rectangle.

37 Write a Python class named Circle constructed by a radius and two methods which will compute the area and the perimeter of a circle.

38 Write a Python program to create a class of Single Linked List.

39 Write a Python program to create a class of FIFO queue.

40 Predict the output of following Python programs and write the justification.

```
class X(object):
    def __init__(self,a):
        self.num = a
    def doubleup(self):
        self.num *= 2

class Y(X):
    def __init__(self,a):
        X.__init__(self, a)
    def tripleup(self):
        self.num *= 3
```

```
obj = Y(4)
print(obj.num)
obj.doubleup()
print(obj.num)
obj.tripleup()
print(obj.num)
```

41 Predict the output of following Python programs and write the justification.

```
# Base or Super class
class Person(object):
  def __init__(self, name):
    self.name = name

  def getName(self):return
    self.name

  def isEmployee(self):
    return False

# Inherited or Subclass (Note Person in bracket)
class Employee(Person):
  def __init__(self, name, eid):
  ''' In Python 3.0+, "super().__init_(name)" also works'''
    super(Employee, self).__init_(name)
    self.empID = eid

  def isEmployee(self):
    return True

  def getID(self): return
    self.empID

# Driver code
emp = Employee("Geek1", "E101")
print(emp.getName(), emp.isEmployee(), emp.getID())
```

42 Create a employees database with the following attributes and insert rows. employee_id, first_name, last_name, email, phone_number, hire_date, job_id, salary, commission_pct, manager_id, department_id

43 Write a query to get the highest, lowest, sum, and average salary of all employees.

44 Write a query to get the average salary for all departments employing more than 10employees.

45 Write a query to find the names (first_name, last_name), the salary of the employees whose salary is greater than the average salary.

46 Write a query to get nth max salaries of employees

Text Books	1. A Python Book: Beginning Python, Advanced Python, and Python Exercises, Dave Kuhlman, Open Source MIT License. 2. Python for Data Analysis, Wes McKinney, O' Reilly.
References	1. Python Data Science Handbook-Essential Tools for Working with 2. Data Science from Scratch, JoelGrus, O'Reilly.

WEB TECHNOLOGIES LAB

II B.Tech–IV Semester (Code:18CSL42)

Lectures	:	3 Periods	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Know elements and tags of HTML and apply Styles using Cascading Style Sheets.
- Know basics of Java Script, Functions, Events, Objects and Working with browser objects.
- Know basics of XML, DOM and advanced features of XML.
- To convert XML documents into other formats and XSLT.

Course Outcomes: At the end of the course students will be able to

CO1	Create a web page layout using HTML5 elements and CSS stylings.
CO2	Implement functions to modularize code, use arrays for storing and manipulating data efficiently and event handling techniques to create dynamic and interactive web applications.
CO3	Demonstrate the knowledge of Javascript objects and DOM to develop interactive and responsive web applications.
CO4	Demonstrate how to handle XML for data exchange and use of Jquery in creating dynamic, data-driven and interactive web applications.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	-	3	-	3	-	-	2	-	2	-	3	3	-	-
CO2	3	-	3	-	3	-	-	2	-	2	-	3	3	-	-
CO3	3	-	3	-	3	-	-	2	-	2	-	3	3	-	-
CO4	3	-	3	-	3	-	-	2	-	2	-	3	3	-	-

LIST OF EXPERIMENTS

1. Write HTML5 document to design a webpage. (Using all fundamental elements, Organizingtext, Links, URLs and Tables).
2. Write HTML5 document to design a webpage. (Using Images, Colors, Canvas & Forms).
3. Write codes for different types of styles in CSS3.
4. Write java scripts covering Function, Arrays and Events.
5. Demonstrate JavaScript objects.
6. Demonstrate browser objects.
7. Demonstrate Document Object Model for an HTML document.
8. Write well-formed and valid XML documents.
9. Write code for converting XML document to HTML using XSLT.
10. Build a webpage using JQuery and its components.

Text Books :	1. Kogent Learning Solutions Inc., HTML5 Black 2. Book: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and Jquery.
References :	1. Harvey M. Deitel and Paul J.Deitel, "Internet &World Wide WebHow to Program",4/e, Pearson Education. 2. Joshua Elchorn, "Understanding AJAX", Prentice Hall 2006.

RDBMS LAB

II B.Tech – IV Semester(Code: 18CSL43)

Lectures	:	3 Periods	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Familiarize with fundamental concepts of database and various database architectures and Design relations for Relational databases using conceptual data modeling.
- Implement formal relational operations in relational algebra and SQL.
- Identify the Indexing types and normalization process for relational databases
- Use mechanisms for the development of multi user database applications.

Course Outcomes: At the end of the course students will be able to

CO1	Design database by using ER diagrams
CO2	Implement DDL, DML and DCL commands.
CO3	Understand the aggregate functions and sub query concepts in SQL.
CO4	Implement Pocedures, functions and cursors using PL/SQL.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3

LIST OF EXPERIMENTS

Experiment 1: Working with ER Diagram and Normalization

Example: ER Diagram for Sailors DatabaseEntities:

1. Sailor
2. Boat Relationship:

Reserves Primary KeyAttributes:

1. SID (Sailor Entity)
2. BID (Boat Entity)

Experiment 2: Working with DDL, DML, DCL and KeyConstraints Creation, Altering and Dropping of Tables and Inserting Rows into a Table (Use ConstraintsWhile Creating Tables) Examples Using Select Command.

Experiment 3: Working with Queries and NestedQUERIES Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints

Expriment 4: Working with Queries USING Aggregate Operators &views Queries using Aggregate Functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and Dropping of Views

Experiment 5: Working with Conversion Functions & StringFunctions Queries using Conversion Functions (TO_CHAR, TO_NUMBER AND TO_DATE), String Functions (CONCATENATION, LPAD, RPAD, LTRIM, RTRIM, LOWER, UPPER, INITCAP, LENGTH, SUBSTR AND INSTR), Date Functions (SYSDATE, NEXT_DAY, ADD_MONTHS, LAST_DAY, MONTHS_BETWEEN), LEAST, GREATEST, TRUNC, ROUND, TO_CHAR, TO_DATE

Experiment 6: Working with Triggers using PL/SQL

Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggersand INSTEAD OF Triggers

Experiment 7: Working with PL/SQLProcedures

Programs Development using Creation of Procedures, Passing Parameters IN and OUT ofPROCEDURES

Experiment 8: Working with LOOPS using PL/SQL and Exception Handling Program Development using WHILE LOOPS, Numeric FOR LOOPS, Nested Loops using ERROR Handling, BUILT-IN Exceptions, USE Defined Exceptions, RAISE-APPLICATION ERROR

Experiment 9: Working with Functions Using PL/SQL

Program Development using Creation of Stored Functions, Invoke Functions in SQL Statements and Write Complex Functions.

Experiment 10: Working CURSORS

Develop Programs using Features Parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of Clause and CURSOR Variables

Experiment11: Installation of SQL

Text Books :	1. Oracle PL/SQL by Example, Benjamin Rosenzweig, ElenaSilvestrova, Pearson Education 3rdEd 2. Oracle Database Logic PL/SQL Programming, Scott Urman, Tata Mc-GrawHill. 3. SQL and PL/SQL for Oracle 10g, Black Book, Dr.P.S.Deshpande

SOFTWARE ENGINEERING
III B.Tech – V Semester (Code: 18CS501)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand different process models of Software Engineering and
- Understand Agile Software Development. How to collect requirements from client and how to analyze the collected requirements.
- Understand how to design and implement the Software Product or Project.
- Understand the concepts of Testing and Measuring the software project or Product.

Course Outcomes: At the end of the course students will be able to

CO1	Recognize the many generic and agile process models.
CO2	Choose appropriate process model depending on the user requirements.
CO3	Develop different design models for the software project.
CO4	Distinguish various testing techniques, software metrics, and measures.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	-	-	-	-	3	3	2	3
CO2	3	3	3	-	3	-	-	-	-	-	-	3	3	2	3
CO3	3	3	3	-	3	-	-	-	-	-	-	3	3	2	3
CO4	3	3	3	-	3	-	-	-	-	-	-	3	3	2	3

UNIT-I	15 Periods

INTRODUCTION TO SOFTWARE ENGINEERING: The Evolving Role of Software, Software, the Changing Nature of Software, Legacy Software, Software Myths.
A GENERIC VIEW OF PROCESS: Software Engineering - A Layered Technology, a Process Framework, the CMMI, Process Patterns, Process Assessment, Personal and Team Process Models, Product and Process.
PROCESS MODELS: Prescriptive Models, the Waterfall Model, Incremental Process Models, Evolutionary Models, the Unified Process.
AN AGILE VIEW OF PROCESS: What Is Agility? What Is an Agile Process? Agile Process Models.

UNIT-II	15 Periods

SOFTWARE ENGINEERING PRACTICE: Software Engineering Practice, CommunicationPractices, Planning Practices, Modeling Practices, Construction Practice, Deployment.

REQUIREMENTS ENGINEERING: A Bridge to Design and Construction, Requirements Engineering Tasks, Initiating the Requirements Engineering Process, Eliciting Requirements, Developing Use-cases, Building the Analysis Model, Negotiating Requirements, Validating Requirements.

BUILDING THE ANALYSIS MODEL: Requirements Analysis, Analysis Modeling Approaches, Data Modeling Concepts, Flow-Oriented Modeling, Class Based Modeling Creating a Behavioral Model.

UNIT-III	15 Periods

DESIGN ENGINEERING: Design within the Context of Software Engineering, Design Process and Design Quality, Design Concepts The Design Model, Pattern Based Software Design.

CREATING AN ARCHITECTURAL DESIGN: Software Architecture, Data Design, Architectural Styles and Patterns, Architectural Design, Assessing Alternative Architectural Designs.

MODELING COMPONENT-LEVEL DESIGN: What Is a Component? Designing Class-Based Components, Conducting Component-Level Design, Designing Conventional Components.

PERFORMING USER INTERFACE DESIGN: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

UNIT-IV	15 Periods

SOFTWARE PROCESS AND PROJECT METRICS: Introduction: Metrics Process and Project Domains, Software Measurement, Metrics for Software Quality, Integrating Metrics with Process.

SOFTWARE QUALITY ASSURANCE: Quality Concepts, Quality Movement, SQA, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Software Reliability, ISO 9000 Quality Standards, SQA Plan.

SOFTWARE TESTING STRATEGIES: Strategic Approach, Strategic Issues, Test strategies for Conventional Software, Test strategies for Object Oriented Software, Validation Testing, System Testing, The Art of Debugging.

Text Book(s):	1. Roger S.Pressman, “Software Engineering- A Practitioner's Approach”, Sixth Edition, McGraw- Hill International.
References :	1. Ian Sommerville, “Software Engineering”, Sixth Edition, Pearson Education. 2. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, “Fundamentals of Software Engineering”, Second Edition, PHI. 3. Rajib Mall, “Fundamentals of Software Engineering”, Second Edition, PHI.

AUTOMATA THEORY & FORMAL LANGUAGES
III B.Tech – V Semester (Code: 18CS502)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the theory of automata and formal languages. Construct finite automata, and conversion between DFA and NFA.
- Demonstrate the connection between regular expressions, languages, and finite automata
- Demonstrate the connection between pushdown automata and context-free languages and Context Free Grammars.
- Construct Turing machines for a given task. Understand undecidability problems about Turing Machine and post correspondence problem (PCP).

Course Outcomes: At the end of the course students will be able to

CO1	Comprehend automata and its uses. Create a finite automata and switch between implementations that are deterministic and nondeterministic.
CO2	Transform finite automata into regular expressions and the other way around. Make a DFA that is minimal.
CO3	Build push-down automata for several context-free languages. Explain how PDA and context-free grammars are related.
CO4	Design Turing machines for different languages. Learn about TM and post correspondence problems that are undecidable and undecidable.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	2	-	-	-	-	-	-	-	-	-	2	2	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-	2	2	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	2	2	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	2	2	-

UNIT-I — 15 Periods

Automata: Why Study Automata Theory, The central concepts of automata theory - Alphabets, Strings, Languages, Problems.

Finite Automata: An Informal picture of finite automata, Deterministic finite automata (DFA) - Definition of DFA, DFA processing strings, Notations for DFA, Extended transition function, the language of DFA, Non deterministic finite automata (NFA) – Definition ofNFA, Extended transition function, the language of NFA, Equivalence of DFA and NFA. Automata with Î transitions: Use of Î - transition, notation for an Î - NFA, Epsilon closures, extended transitions and languages, Eliminating Î - transitions.

UNIT-II — 15 Periods

Regular Expressions and Languages: Regular expressions, finite automata and regular expressions, Algebraic laws of regular expressions. Properties of Regular Languages: Proving languages are not regular – Pumping lemma for regular languages, Applications of the pumping lemma, Closure Properties of Regular Languages, Equivalence and minimization of automata – Minimization of DFA.	
UNIT-III	15 Periods
(Construction based treatment & proofs are excluded) Context Free Grammars: Context Free Grammars, Parse Trees, ambiguous grammars. Pushdown Automata: Definition of the Pushdown automata, the languages of PDA, Equivalences of PDA's and CFG's. Context free languages: Normal form's for context- Free grammars, the pumping lemma forcontext free languages.	
UNIT-IV	15 Periods
Properties of Context free languages: closure properties for context free languages, Decision properties for CFL's. Introduction to Turing Machines: The Turing Machine, programming techniques for Turing machines. Undecidability: a language that is not recursively enumerable, an undecidable problem that is RE, Undecidability problems about TM, Post's Correspondence problem.	
Text Book(s) :	1. John E.Hopcroft, Rajeev Motwani, & Jeffery D. Ullman, "Introduction to Automata Theory Languages and Computations", Third Edition, Pearson Education, 2008.
References :	1. Cohen, "Computer Theory", KLP Mishra & N.Chandrasekharan, "Theory of Computation", PHI. 2. H.R.Lewis, C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pearson Education, 2003. 3. J.Martin, "Introduction to Languages and the Theory ofComputation", Third Edition, Tata McGraw Hill, 2003. 4. MichealSipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997. 5. Ragade, "Automata and Theoretical Computer Science", First Edition, Pearson Education, 2004.

ENTERPRISE PROGRAMMING
III B.Tech – V Semester (Code: 18CS503)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Develop an application using servlets and JDBC.
- Design an application using JSP and JSF.
- Create an application on web services and web sockets.
- Code an enterprise application using EJBs and Persistence API.

Course Outcomes: At the end of the course students will be able to

CO1	Understand J2EE as an architecture and platform for building and deploying web-based enterprise applications. Learn how to build database-driven, Web applications using Java. Demonstrate the functionality of Java Servlets.
CO2	Demonstrate the functionality of JSP and JSF applications
CO3	Develop Web Service and Socket applications.
CO4	Understand the EJB architecture and have a good grasp on when to use and how to use various EJB bean types and acquire relevant Java programming experience.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO2	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO3	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO4	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3

UNIT-I — 15 Periods

.The Big Picture : Java EE Architecture, The Many Variations of Java EE Applications, Packaging and Deploying the Java EE Application, Java EE Platform and Implementations. Classic Memories : JDBC - Introduction to JDBC, Structured Query Language, The JDBC APIs.
Java Servlets and Web Applications: Foundations of the Web Tier : The HTTP Protocol, Introducing Java Servlets, Understanding the Java Servlet API, Web Applications, Java Servlets: The Good and the Bad

UNIT-II — 15 Periods

Dynamic Web Pages : JSP - JSP Runtime Architecture, JSP Syntax, The Java Environment for JSPs, JSP Standard Tags, Custom Tag Libraries, Expression Language.
Assembling Dynamic Web Pages: JavaServer Faces - Architecture of a JSF Application, JavaServer Faces Tags, Java EE Managed Beans, f: Core Tags, JSTL Core Tags, Extensibility and Modularity.

UNIT-III	15 Periods
Web Sites for Non-browsers: JAX-RS - What Are RESTful Web Services, The Java API for RESTful Web Services, Deploying JAX-RS Resources, Content Production, Content Consumption, Accessing Web Service Context, Exception Mapping, Number of Instances of Resource Classes, Path Mapping. JSON Processing : Streaming API : Consuming JSON Using the Streaming API, Producing JSON Using the Streaming API; Object Model API : Consuming JSON Usingthe Object Model API , Producing JSON Using the Object Model API. Adding Sparkle : Java WebSockets - Introduction to the WebSocket Protocol, The WebSocket Lifecycle, Overview of the Java WebSocket API, Java WebSocket Encoders and Decoders, Message Processing Modes, Path Mapping, Deployment of Server Endpoints.	
UNIT-IV	16 Periods
The Fundamentals of Enterprise Beans : Introduction to Enterprise Beans, Hello Enterprise Beans, Flavors of Enterprise Beans, Exposing Enterprise Beans, Finding Enterprise Beans, EJB Lifecycle, Packaging Enterprise Beans. Advanced Thinking with Enterprise Beans : Multithreading and Enterprise Beans, Asynchronous Enterprise Beans, Enterprise Bean Contexts, The Timer Service, Transactions and Enterprise Beans, Interceptors. Modern Memories : The Java Persistence API - Persistence Entities, The Entity Manager, Java Persistence Query Language, Configuring JPA Applications.	
Text Book(s):	1. Dr. Danny Coward, “Java EE 7: The Big Picture”, oracle press. 2. Arun Gupta “Java EE 7 Essentials” O’Reilly.
References :	1. Antonio Goncalves “Beginning Java EE 7 ” apress.

COMPUTER NETWORKS
III B.Tech – VI Semester (Code: 18CS504)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the basic concepts of data communication, layered model, protocols and OSI&TCP layers.
- Understand the basic concepts of Data Link control, Network Layer Design Issues, Routing Algorithms & Congestion.
- Understand the basic concepts of Quality of service, Network Layer & Transport Layer
- Understand the basic concepts of TCP, UDP & Application Layer

Course Outcomes: At the end of the course students will be able to

CO1	Understand the fundamentals of networks, network reference models and various error coercion and detection techniques in data communication.
CO2	Analyze error control, flow control mechanisms used at data link layer and various routing and congestion control protocols in network design.
CO3	Understand the basic principles of OPV4 and its addressing mechanisms, elements of transport protocols in transport layer.
CO4	Analyze the underlying protocols in transport layer and application layer.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-	3

UNIT-I — 15 Periods

Data Communications & Networking Overview: A Communications Model, Data Communications, Data Communication Networking.
Protocol Architecture: The Need for a Protocol Architecture, A Simple Protocol Architecture, OSI, The TCP/IP Protocol Architecture.
Digital Data Communication Techniques: Asynchronous & Synchronous Transmission, Types of Errors, Error Detection, Error Correction.

UNIT-II — 16 Periods

Data Link Control: Flow Control, Error Control.
Network Layer: Network Layer Design Issues: Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual-Circuit & Datagram Subnets.
Routing Algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing.
Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets, Load Shedding, Jitter Control.

UNIT-III	16 Periods

Quality of Service: Requirements, Techniques for Achieving Good Quality of Service The Network Layer in the Internet: The IP Protocol, IP Addresses, Internet Control Protocols.
The Transport Layer:
The Transport Service: Services Provided to the Upper Layers, Transport Service Primitives, Berkeley sockets.
Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing, Crash Recovery.

UNIT-IV	15 Periods

The Internet Transport Protocol (UDP): Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol.
The Internet Transport Protocols (TCP): Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control, TCP Timer Management.
Application Layer:
The Domain Name System (DNS): The DNS Name Space, Resource Records, Name Servers.

Text Book(s):	1. Behrouz A.Forouzan, "Data Communications and Networking", 4th edition, TMH. 2. Tanenbaum, "Computer Networks", 4th Edition, (Pearson Education / PHI).
References :	1. Wayne Tomasi, "Introduction to Data Communications and Networking", PHI. 2. GodBole, "Data Communications & Networking", TMH. 3. Nader F.Mir, "Computer and Communication Networks", PHI

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE
(Common for all branches)
III B.Tech – V Semester (Code: 18CS505)

Lectures :	3 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Generalize the effect of precolonial and colonial period on Indian Traditional Knowledge System, traditional Medicine.
- Discover the knowledge of ITK in Production, Construction, Physics, Chemistry, Architecture and Vastu
- Discriminate the contribution of India in Mathematics, Astronomy & Astrology
- Propose the importance of Yoga in holistic living.

Course Outcomes: At the end of the course students will be able to

CO1	Acknowledge the significance of ITK, the results of colonial rule, and conventional medicine.
CO2	Know how well ITKS performs in the fields of architecture, physics, and chemistry.
CO3	Discover about India's contributions to mathematics and astronomy.
CO4	Know the benefits of Yoga, yogasanas, pranayama in leading a Happy and Healthy life

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-

UNIT-I 12 Periods

1. Historical Background: TKS during the Pre-colonial and Colonial Period
2. Indian Traditional Knowledge System
3. Traditional Medicine: Ayurveda, Simple Definition, Origin, Texts, The Great Three Classics of Ayurveda, The Lesser Three Classics of Ayurveda, The Branches of Ayurveda, Basic Concepts of Ayurveda, Purusha/Prakruti, Manifestation of Creation, Space, Air, Fire, Water, Earth, Mental Constitution, Satvic Mental Constitutions, Rajasic Mental Constitutions, Tamasic Mental Constitutions, Vata, Pitta and Kapha: The Three Doshas

UNIT-II 12 Periods

4. Traditional Production and Construction Technology: Social Conditions and Technological Progress, The Impetus for Metallurgy, Social Needs and Technological Applications, Scientific Rationalism and Technological Efficacy, Cultural Mores and Technological Innovation, State Support of Technology, Limitations of Pre-Industrial

Manufacturing, India and the Industrial Revolution.

5. History of Physics and Chemistry: Philosophy and Physical Science, Particle Physics, Optics and Sound, Astronomy and Physics, The Laws of Motion, Experimentation versus Intuition, The Social Milieu, The Five Basic Physical Elements, Indian Ideas about Atomic Physics.
6. Traditional Art and Architecture and Vastu Shashtra: Vastu, The Principles of Vastu are Simple.

UNIT-III	12 Periods

7. Origin of Mathematics
8. Astronomy and Astrology
9. TKS and the Indian Union: Protection and the Legislative Frameworks in India, Comment, Sui Generis System, Trade Secrets and Know-how, Geographical Indications Bill, Protection of Plan varieties and Farmers Rights Bill, Rights of Communities, Monitoring Information on Patent Applications World-wide, Frameworks for SupportingR&D Activities in the Area of TKS

UNIT-IV	12 Periods

Common Yoga Protocol: Introduction, What is Yoga? Brief History and Development of Yoga, The fundamentals of Yoga, Traditional Schools of Yoga, Yogic practices for health and wellness

General Guidelines for Yoga Practice: Before the practice, During the Practice, After thePractice, Food for Thought, How Yoga can Help.

1. Invocation,
2. Sadilaja/Cālana Kriyās /Loosening Practices,

3. Yogāsanas:

A. Standing Postures: Tāḍāsana (Palm Tree Posture), Vṛkṣāsana (The Tree Posture), Pāda-Hastāsana (The Hands to Feet Posture), Ardha Cakrāsana (The Half Wheel Posture), Trikonāsana (The Triangle Posture)

B. Sitting Postures: Bhadrāsana (The Firm/Auspicious Posture), Vajrāsana (Thunderbolt Posture), Uṣṭrāsana (Camel Posture), Śaśakāsana (The Hare Posture), Vakrāsana (The Spinal Twist Posture),

C. Prone Postures: Makarāsana (The Crocodile Posture), Bhujaṅgāsana (The Cobra Posture), Śalabhāsana (The Locust Posture),

D. Supine Postures: Setubandhāsana (The Bridge Posture), Uttāna Pāḍāsana (Raised feet posture), Pavana Muktāsana (The Wind Releasing Posture), Śavāsana (The Corpse/ Dead Body Posture)

4. Kapālabhāti
5. Prānāyāma: naḍīśodhana or anuloma viloma prānāyāma (Alternate Nostril Breathing), Śītalī Prāṇāyāma, Bhrāmarī Prāṇāyāma (Bhrāmarī Recaka)
6. Dhyāna
7. *Sankalpa*
8. Śantih pātha

Text Book(s):	1. Traditional Knowledge System in India, Amit Jha, 2009 2. Common YOGA Protocol, Ministry of Ayush

References:	1. Traditional Knowledge System & Technology in India, Basanta Kumar Mohanta, Vipin Kumar Singh, 2012

ADVANCED COMPUTER ARCHITECTURE
Department Elective-I
III B.Tech – V Semester (Code:18CSD11)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the Concept of Parallel Processing and its applications.
- Implement the Hardware for Arithmetic Operations.
- Analyze the performance of different scalar Computers.
- Develop the Pipelining Concept for a given set of Instructions.
- Distinguish the performance of pipelining and non pipelining environment in a processor.

Course Outcomes: At the end of the course students will be able to

CO1	Discover about the various system interconnect architectures, as well as parallel models like multiprocessors, multicomputers, multivector, and SIMD computers. Students should also be familiar with concepts like dependencies, parallelism, flow mechanisms, program partitioning and scheduling.
CO2	Recognize the performance laws, analytics, and pipelining that accelerate performance.
CO3	Know the various workings of Scalable, Multithreaded, and Data Flow Architectures and Multiprocessor Systems.
CO4	Discover about several parallel languages, models, and compilers.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	-	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	-	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	2	-	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	2	-	2	-	-	-	-	-	-	-	-	-	3	-	-

UNIT-I 16 Periods

Parallel Computer Models: The state of computing, Classification of parallel computers, Multiprocessors and Multi computers, Multi-vector and SIMD computers.
Program and network properties: Conditions of parallelism, Data and resource Dependencies, Hardware and Software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms.
System Interconnect Architectures: Network properties and routing, Static interconnection Networks, Dynamic interconnection Networks, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

UNIT-II 16 Periods

Principles of Scalable Performance: Performance Metrics and Measures: Parallelism Profile in Programs, Efficiency, Utilization and Quality, Standard Performance Measures, Speedup Performance Laws: Amdahl's law for fixed load, Gustafson's law for scaled problems, Memory Bounded Speedup Model.
Pipelining: Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design- Instruction Execution Phases, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, Arithmetic Pipeline Design: Computer Arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines.

UNIT-III	16 Periods

MULTI Processors: Multiprocessor System Interconnect: Hierarchical Bus Systems, Crossbar Switch and Multiport Memory, Multistage and Combining Networks, Cache Coherence and Synchronization Mechanisms: The Cache Coherence problem, Snoopy Bus Protocols, Directory Based Protocols, Hardware Synchronization Mechanisms, Message-passing Mechanism: Message Routing Schemes, Deadlock and Virtual Channels, Flow Control Strategies, Multicast Routing Algorithms.
Scalable, Multithreaded and Dataflow Architectures: Latency-Hiding Techniques, Principles of Multithreading, Scalable and Multithreaded Architectures.

UNIT-IV	16 Periods

Thread Based Parallelism: Introduction, Using the python threading model, How to define a Thread, How to determine a current Thread, How to use a thread in subclass, Thread Synchronization with Lock and RLock, Thread Synchronization with RLock, Thread Synchronization with Semaphores, Thread Synchronization with a Condition, Thread Synchronization with an Event, Using a with Statement, Thread Communication with a Queue, Evaluating the performance of Multithreaded applications.

Process Based Parallelism: Introduction, How to spawn a process, How to name a Process, How to run a Process in the background, How to kill a process, How to use a process in subclass, how to exchange objects between processes, How to synchronize the Processes, How to manage a state between Processes, How to use a Process pool, Usingthe mpi4py python module, Point-to-Point to Communications, Avoiding Dedalock problems, Collective communication using Broadcast, Collective Communication using a Scatter, Collective Communication using Gather, Collective Communication using Alltoall, The reduce operation, How to Optimize an Operation.

Text Book(s):	1. Kai Hwang, "Advanced Computer Architecture", TMH. 2. "Python Parallel Programming cookbook", Giancarlo Zaccone, Packt Publishing.
References:	1. D.A. Patterson and J.L.Hennessy, "Computer organization andDesign", Morgan Kaufmann, 2nd Edition. 2. V.Rajaram & C.S.R.Murthy, "Parallel Computer", PHI. 3. Barry Wilkinson and Michael Allen, "Parallel Programming", Pearson Education. 4. Parallel Programming with Python, Jan Palach, Packt Publishing

DATA WAREHOUSING & DATA MINING
Department Elective-I
III B.Tech – V Semester (Code: 18CSD12)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Identify the scope and necessity of Data Warehousing & Mining for the society.
- Understand importance of data, data preprocessing techniques to solve the real time problems.
- Understand and implement classical models and algorithms in data warehouses and data mining.
- Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Outcomes: At the end of the course students will be able to

CO1	Understand the process of Data pre-processing and data mining Task.
CO2	Understand the architecture of Data warehouse and Data Model.
CO3	Understanding of evaluation of the association rule and classification Algorithms.
CO4	Analyze clustering and assess clustering algorithm and Outlier Detection.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	3	-	-	-	-	-	-	2	3	3	2
CO2	3	3	3	3	3	-	-	-	-	-	-	2	3	3	2
CO3	3	3	3	3	3	-	-	-	-	-	-	2	3	3	2
CO4	3	3	3	3	3	-	-	-	-	-	-	2	3	3	2

UNIT-I — 15 Periods

Introduction to Data Warehousing: A Short Historical Note, Increasing Demand for Strategic Information, Data Warehouse Defined, Data Warehouse Users, Benefits of Data Warehousing, Concerns in Data Warehousing.

Data Warehouse: Defining Features: Introduction, Features of a Data Warehouse, Data Granularity, The Information Flow Mechanism, Metadata, Two Classes of Data, The Lifecycle of Data, Data Flow from Warehouse to Operational Systems.

Architecture of a Data Warehouse: Introduction, Characteristics of Data Warehouse Architecture, Data Warehouse Architecture Goals, Data Warehouse Architecture, Data Warehouse and Data Mart Issues in Building Data Marts, Building Data Marts, Other Data Mart Issues, Increased Popularity of Data Marts, Can Data Warehouse and Data Mart Co-exist? Pushing and Pulling Data.

UNIT-II — 15 Periods

Gathering the Business Requirements: Introduction, Determining the End-user Requirements, Requirements Gathering Methods, Requirements Analysis, Dimensional Analysis, Information Package Diagrams (IPD).
Planning and Project Management: Project Management Principles, Data Warehouse Readiness Assessment, Data Warehouse Project Team, Planning for the Data Warehouse,Data Warehouse Project Plan, Economic Feasibility Analysis, Planning for the Data Warehouse Server, Capacity Planning, Selecting the Operating System, Selecting the Database Software, Selecting the Tools.
Data Warehouse Schema: Introduction, Dimensional Modelling, The Star Schema, The Snowflake Schema, Aggregate Tables, Fact Constellation Schema, The Strengths of Dimensional Modelling, Data Warehouse and the Data Model.

UNIT-III	15 Periods

Dimensional Modelling: Characteristics of a Dimension Table, Characteristics of a Fact Table, The Factless Fact Table, Updates to the Dimension Tables, Cyclicity of Data—The Wrinkle of Time, Other Types of Dimension Tables, Keys in the Data Warehouse (Star) Schema, Enhancing the Data Warehouse Performance, Technology Requirements.
The ETL Process: Introduction, Data Extraction, Data Transformation, Data Loading, Data Quality.
OLAP in the Data Warehouse: Need for OLAP, OLAP, OLAP and Multidimensional Analysis, OLAP Functions, OLAP Applications, OLAP Models, OLAP Design Considerations, OLAP Tools and Products, Existing OLAP Tools,Administration and Performance, OLAP Platforms.

UNIT-IV	15 Periods

Building a Data Warehouse: Introduction, Problem Definition, Critical Success Factors, Requirement Analysis, Planning for the Data Warehouse, The Data Warehouse Design Stage, Building and Implementing Data Marts, Building Data Warehouses, Backup and Recovery, Establish the Data Quality Framework, Operating the Warehouse, Recipe for a Successful Warehouse, Data Warehouse Pitfalls.
Trends in Data Warehousing: Introduction, Data Warehouse Solutions, Web-enabled Data Warehouse, Distributed Data Warehouse, Virtual Data Warehouses, Operational Data Store, Integration with Other Technologies, Trends in Data Warehousing, Data Warehouse Futures.

Text Book(s):	1. Data Warehousing by Reema Thareja, Oxford University Press(2012).
References:	1. Data Warehousing: Fundamentals for IT Professionals by Paulraj Ponniah, Wiley; Second edition (2012). 2. Data Warehousing in the Real World: A Practical Guide forBuilding Decision Support Systems by Anahory (2002).

DISTRIBUTED COMPUTING
Department Elective-I
IV B.Tech – V Semester (Code: 18CSD13)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- understand and comprehend the architecture of distributed systems.
- understand and comprehend process in distributed systems.
- understand and apply naming and coordination of systems.
- understand consistency and fault tolerance in distributed systems.

Course Outcomes: At the end of the course students will be able to

CO1	Recognize the definition of a distributed system, the rationale behind designing a system in this way, and the desired characteristics of such systems.
CO2	Describe the process and communication of distributed system.
CO3	Describe the synchronization of distributed system.
CO4	Recognize the consistency and replication of distributed system.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	-	2	1	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-	1	1	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	1	1	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	2	1	-

UNIT-I	15 Periods

Introduction: What is a distributed system? Design goals, Types of distributed systems. Architectures: Architectural styles, Middleware organization, System architecture, Example architectures.

UNIT-II	15 Periods

Processes: Threads, Virtualization, Clients, Servers, Code migration. Communication: Types of Communication, Remote procedure call, Message-oriented communication, Multicast communication.

UNIT-III	15 Periods

Naming: Names, identifiers, and addresses, Flat naming, Structured naming, Attribute-based naming.
Coordination: Clock synchronization, Logical clocks, Mutual exclusion, Election algorithms, Location systems.

UNIT-IV	15 Periods

Consistency and replication: Introduction, Data-centric consistency models, Client-centric consistency models, Replica management, Consistency protocols. Fault tolerance: Introduction to fault tolerance, Process resilience, Reliable client-server communication, Reliable group communication, Distributed commit, Recovery.	
Text Book(s):	1. Andrew S.Tanenbaum, Maarten Van Steen, "Distributed Systems", Third Edition (2017), Pearson Education/PHI.
References:	1. Coulouris, Dollimore, Kindberg, "Distributed Systems-Conceptsand Design", 3rd edition, Pearson Education. 2. Mukesh, Singhal & Niranjan G.Shivarathri, "Advanced Conceptsin Operating Systems", TMH. 3. Sinha, "Distributed Operating System – Concepts and Design", PHI.

C# PROGRAMMING LAB III B.Tech – V Semester (Code:18CSL51)		
Lecture: 2 Periods, Practical:3 Periods	Continuous Internal Assessment :	50 Marks
Final Exam : 3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Learn the basic elements of C# and practice the basic programming concepts.
- Understand and apply object oriented concepts in c#.
- Understand the concepts of inheritance and polymorphism and apply them in real world.
- Learn to handle exceptions and build the application handling exceptions.

Course Outcomes: At the end of the course students will be able to

CO1	Identify the basic constructs of C# with a view of using them in problem solving.
CO2	Apply object oriented features of C# to solve real world problems.
CO3	Demonstrate the usage of inheritance and polymorphism.
CO4	Build applications handling Exceptions, Events.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3

UNIT-I — 20 Periods

Elements of C#: The C# keywords, Identifiers, Data Types, Literals, Variables, Operators & Program Control Statements.

Arrays and Strings: Arrays, Multidimensional Arrays, Jagged Arrays, Assigning Array References, Using the Length Property, Implicitly Typed Arrays, The foreach Loop, Exploring String Class Methods.

LIST OF EXPERIMENTS

Write a program to demonstrate Arrays (2-D and jagged).Design a class to demonstrate String class methods.

UNIT-II — 20 Periods

Introducing Classes and Objects: Class Fundamentals, How Objects Are Created, Reference Variables and Assignment, Methods, Constructors, the new Operator Revisited, Garbage Collection and Destructors. 'this' Keyword. A Closer Look at Methods and Classes: Controlling Access to Class Members, Pass References to Methods, Use ref and out Parameters, Use a Variable Number of Arguments, Return Objects, Method Overloading, Overload Constructors, Object Initializers, Optional Arguments, Named Arguments, The Main( ) Method, Recursion, Understanding static, Static Classes, Properties.	
LIST OF EXPERIMENTS	
Implement a class List and the list operations. Use all possible basic features of C#.Write a c# program to demonstrate Ref, Out & Variable No. of Arguments.	
UNIT-III	20 Periods
Inheritance: Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Inheritance and Name Hiding, Creating a Multilevel Hierarchy, When Are Constructors Called, Base Class References and Derived Objects, Virtual Methods and Overriding, Applying Virtual Methods, Using Abstract Classes. Interfaces: Interfaces, Implementing Interfaces.	
LIST OF EXPERIMENTS	
Implement a class hierarchy with Abstract Classes, Virtual methods & Overriding.Write a C# program to demonstrate interfaces.	
UNIT-IV	20 Periods
Exception Handling: Exception-Handling Fundamentals, A Simple Exception Example	
Using following Keywords: try, catch, finally & throw. Delegates & Events: Delegates, Events-Delegates, Events, Namespaces.	
LIST OF EXPERIMENTS	
Write a C# program to create and handle user defined exception. Implement a class clock that publishes seconds change event. Design classes that subscribeto the event with respective behaviours.	
TextBook(s):	1. C# 4.0 The Complete Reference by Herbert Schildt, Tata McGrawHill, 2010.
References:	1. Programming C# 5.0 by Ian Griffiths, O'REILLY, 2012. 2. Programming C#, 2nd Edition, O'REILLY, 2002. 3. Programming C# 3.0, Fifth Edition, Jesse Liberty & Donald Xie, O'Reilly Publ.

ENTERPRISE PROGRAMMING LAB
III B.Tech – V Semester (Code: 18CSL52)

Practicals :	3 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Develop an application using servlets and JDBC.
- Design an application using JSP and JSF.
- Create an application on web services and web sockets.
- Code an enterprise application using EJBs and Persistence API

Course Outcomes: At the end of the course students will be able to

CO1	Develop an application using servlets and JDBC.
CO2	Design an application using JSP and JSF.
CO3	Create an application on web services and web sockets.
CO4	Code an enterprise application using EJBs and Persistence API

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3

LIST OF EXPERIMENTS

1. Write a JDBC application to implement DDL and DML commands.
2. Write an application to demonstrate HTTP Servlets.
3. Write an application to demonstrate cookie & Sessions.
4. Write an application to integrate JSP & Servlets.
5. Write an application to demonstrate custom tags and standard tags in JSP.
6. Write an application to demonstrate JSF validators, event handlers and convertors.
7. Write an application to demonstrate web service.
8. Write a chat application using Web sockets.
9. Write an application to demonstrate Session Bean and Entity Bean (persistence).
10. Write an application to demonstrate Asynchronous and Timer services of Enterprise Bean.

Text Book(s):
1. Dr. Danny Coward, "Java EE 7: The Big Picture", oracle press.
2. Arun Gupta "Java EE 7 Essentials" O'Reilly.

References:
1. Antonio Goncalves "Beginning Java EE 7 " apress.

SOFT SKILLS LAB
(Common for all branches)
III B.Tech – V Semester (Code: 18ELL02)

Practicals :	3 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
- To know the importance of interpersonal and intrapersonal skills in an employability setting.
- Actively participate in group discussions / interviews and prepare & deliver Presentations.
- Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, stress management and leadership quality.

Course Outcomes: At the end of the course students will be able to

CO1	Use appropriate body language in social and professional contexts.
CO2	Demonstrate different strategies in presenting themselves in professional contexts.
CO3	Analyze and develop their own strategies of facing the interviews successfully.
CO4	Develop team coordinating skills as well leadership qualities.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	-	-	-	2	3	3	2	2	-	2	-
CO2	-	-	-	-	-	-	-	2	3	3	2	2	-	2	-
CO3	-	-	-	-	-	-	-	2	3	3	2	2	-	2	-
CO4	-	-	-	-	-	-	-	2	3	3	2	2	-	2	-

LIST OF EXPERIMENTS

1. BODY LANGUAGE
   a. Facial Expressions.
   b. Kinesics.
   c. Oculesics.
   d. Haptics.
   e. Proxemics.
   f. Para Linguistics.
2. LIFE SKILLS
   a. Positive Attitude
   b. Social Behaviour & Social Norms.

c. Ethics, Values and Positive Work Ethics.
d. Time Management
e. Goal Setting, Vision, Mission.

3. EMOTIONAL INTELLIGENCE
   a. Self-Awareness through Johari Window and SWOT analysis.
   b. Self-Control.
   c. Self-Motivation.
   d. Empathy.
   e. Social Skills.
   f. Self Esteem.
   g. Managing stress.
   h. Assertiveness.
4. PROBLEM SOLVING SKILLS
   a. Critical Thinking and Brain Storming
   b. Lateral Thinking and Six Thinking Hats.
   c. Creative Thinking.
   d. Conflict Management.
5. EMPLOYABILITY SKILLS
   a. Group Discussion.
   b. Team Building and Leadership Qualities
   c. Interview Skills.

References :

1. "The Definitive Book Of Body Language", Allan & Barbara Pease
2. "You Can Win", Shiv Khera.
3. "Lateral Thinking", Edward De Bono.
4. "How To Prepare For Group Discussions And Interview", Hari Mohan
5. Prasad, Rajnish Mohan, 2nd Edition, TMH.
6. "Emotional Intelligence", Daniel Goleman.
7. "The 7 Habits Of Highly Effective People", Stephen R. Covey
8. "Working in Teams", Sandy Pokras.

MACHINE LEARNING
III B.Tech – VI Semester (Code:18CS601)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Learn a Regression Model.
- Comprehend a Supervised Learning Model.
- Apply Ensemble methods for improving the performance of a Learning Model.
- Apply an Unsupervised Learning Model.

Course Outcomes: At the end of the course students will be able to

CO1	Understand a very broad collection of machine learning algorithms, problems and apply the correct regression model for the given problem and implement it.
CO2	Analyze the supervised discriminative and generate models for the given problem and implement it.
CO3	Identify the supervised strong learning model for the given problem and implement it.
CO4	Learn the basics of the learning problem with hypothesis, version spaces and choose the correct clustering algorithm for the given problem and implement it.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	3	-	-	-	-	-	-	2	3	3	3
CO2	3	3	3	3	3	-	-	-	-	-	-	2	3	3	3
CO3	3	3	3	3	3	-	-	-	-	-	-	2	3	3	3
CO4	3	3	3	3	3	-	-	-	-	-	-	2	3	3	3

UNIT-I — 15 Periods

Machine learning: Introduction.
Linear Regression: Simple linear regression. Multiple linear regression, Batch Gradient descent algorithm, Stochastic gradient descent algorithm, Locally weighted linear regression.
Decision Tree Learning: Decision Tree representation, appropriate problems for Decision Tree learning, hypothesis space search in Decision Tree learning, inductive bias in Decision Tree learning and issues in Decision Tree learning.

UNIT-II — 15 Periods

Artificial Neural Networks: Neural Network representations, appropriate problems for Neural Network learning, Perceptron, Multilayer Networks and the Backpropagation Algorithm and remarks on the Back propagation algorithm. Evaluating Hypotheses: Estimating hypothesis accuracy, basics of sampling theory, general approach for deriving confidence intervals, difference in error of two hypotheses and comparing learning algorithms.	
UNIT-III	15 Periods
Generative Classifiers::Learning Classifiers based on Bayes Rule, Naïve Bayes Algorithm, Conditional Independence, Derivation of Naïve Bayes Algorithm, Naïve Bayes For discrete-valued Inputs, Naïve Bayes For continuous inputs. Discriminative Classifiers:: Logistic Regression, Estimating Parameters For Logistic Regression, Regularization in Logistic Regression, Logistic Regression for functions with many discrete values, Relationship between Naïve Bayes classifiers and Logistic Regression.	
UNIT-IV	15 Periods
Computational learning theory: Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis spaces, and sample complexity for infinite hypothesis spaces. Instance Based Learning: Introduction, k-Nearest Neighbor learning. Unsupervised Learning: K-means clustering algorithm.	
Text Book(s):	1. Tom M. Mitchell, "Machine Learning", Mc. Graw Hill Publishing.
References:	1. Lecture Notes by Mr. Andrew Ng, Stanford University (cs229.stanford.edu/notes/)

COMPILER DESIGN
III B.Tech – VI Semester (Code: 18CS602)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- To comprehend the principles involved in the design and construction of compilers, the algorithms involved in the design and construction of compilers, Understand the design of lexical analyzer.
- To practice Various Bottom up parsing techniques.
- To apply Various Intermediate languages. To understand Code generation algorithm
- Various storage allocation strategies, Various Symbol table data structures.

Course Outcomes: At the end of the course students will be able to

CO1	Comprehend the ideas of compiler design and construction, as well as the algorithms underlying these processes, Recognize the lexical analyzer's layout.
CO2	Practice different Bottom-up parsing methods.
CO3	Implement a number of intermediate languages. in order to comprehend the code generating algorithm.
CO4	Illustrate the Various storage allocation strategies and Symbol table data structures.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO4	2	2	2	-	-	-	-	-	-	-	-	-	3	2	-

UNIT-I — 16 Periods

Introduction to compiling: Compilers, The Phases of a compiler, The grouping of phases, Compiler construction tools.
Lexical Analysis: The role of the lexical analyzer, input buffering, simplification of tokens, Recognition of tokens, implementing transition diagrams, a language for specifying lexical analyzers.
Syntax analysis: Writing a grammar-elimination of left recursion, left factoring. Top down parsing - Recursive descent parsing, Predictive parsers.

UNIT-II — 14 Periods

Syntax Analysis: Bottom up parsing - Shift Reduce parsing, LR Parsers – LR parsing algorithm, Construction of SLR, Canonical LR and LALR parsing techniques, Parser generators – Yacc Tool. Syntax – Directed Translation: Syntax Directed definition, construction of syntax trees, Bottom-up evaluation of S – attributed definitions.	
UNIT-III	16 Periods
Intermediate code Generation: Intermediate languages, Declarations-Declarations in procedures, Assignment statements-Names in symbol table, Re-using Temporary Names, Boolean expressions- Numerical representation, short circuit code, Back patching. Code Generation- Issues in the design of code generator, the target machines, Basic blocks and flow graphs, Next use information, A simple code generator.	
UNIT-IV	14 Periods
Runtime Environment: Source language issues, Storage organization, Storage-allocation strategies. Symbol Tables: Symbol table entries, Data structures to symbol tables, representing scope information.	
Text Book(s) :	1. Alfred V.Aho, Ravi Sethi, JD Ullman, "Compilers Principles, Techniques and Tools", Pearson Education, 2013.
References :	1. Alfred V.Aho, Jeffrey D. Ullman, "Principles of CompilerDesign", Narosa publishing. 2. Lex Yacc", John R. Levine, Tony Mason, Doug Brown,O'reilly. 3. Modern Compiler Implementation in C", Andrew N. Appel, Cambridge University Press

CRYPTOGRAPHY & NETWORK SECURITY
III B.Tech – VI Semester (Code:18CS603)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- know about security services, attacks and various encryption techniques.
- understand the concept of public key cryptography and study about message authentication and hash functions.
- Understand the digital signature, key management and email security mechanisms.
- impart knowledge on Transport layer & Network layer security

Course Outcomes: At the end of the course students will be able to

CO1	Identify common network security vulnerabilities/attack and understand various symmetric encryption techniques.
CO2	Analyze and apply the concepts of various public key encryption and cryptographic hash functions.
CO3	Evaluate the authentication, key management and describe various application layer mechanisms.
CO4	Illustrate the various security mechanisms of transport layer and network layer.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	2	2
CO2	2	3	3	-	-	-	-	-	-	-	-	-	3	2	2
CO3	2	2	-	-	-	-	-	-	-	-	-	-	-	2	2
CO4		2	3	-	-	-	-	-	-	-	-	-	-	2	2

UNIT-I — 16 Periods

Introduction: Security Goals, Attacks, Service and Mechanism, Techniques
Traditional symmetric key ciphers: Introduction, Substitution Ciphers, Transposition Ciphers, Stream and Block Ciphers
Data Encryption Standard (DES): Introduction, DES Structure, DES Analysis, Multiple DES, Security of DES
Encipherment using Modern Symmetric Key Ciphers: Use of Modern Block Ciphers
Advanced Encryption Standard: Introduction, Transformations, Key Expansion, Ciphers.

UNIT-II — 16 Periods

Mathematics of Cryptography: Primes, Primality Testing, Factorization, ChineseReminder Theorem, Quadratic Congruence, Exponentiation and Logarithm.
Asymmetric Key Cryptography: Introduction, RSA Crypto System, Robin Crypto System, Elgamal Crypto System.
Message Integrity and Message Authentication: Message Integrity, Message Authentication.
Cryptographic Hash Functions: Introduction, SHA-512.

UNIT-III — 16 Periods

Digital Signatures: Comparison, Process, Services, Attacks on Digital Signature, Digital Signature Schemes. Key Management: symmetric key distribution, Kerberos, Symmetric Key Agreement, Public Key Distribution. Security at the Application Layer: E-Mail, PGP, S-MIME.	
UNIT-IV	16 Periods
Security at the Transport Layer: SSL Architecture, Four Protocols, SSL MessageFormat, Transport Layer Security. Security at the Network Layer: Two Modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange, ISAKMP.	
Text Book(s):	Cryptography and network security - Behrouz A. Forouzan
References :	1. William Stallings "Cryptography and Network Security" 4th Edition, (Pearson Education/PHI). 2. Kaufman, Perlman, Speciner, "NETWORK SECURITY", 2nd Edition, (PHI / Eastern Economy Edition) 3. Trappe & Washington, "Introduction to Cryptography with Coding Theory", 2/e, Pearson.

MIDDLEWARE TECHNOLOGIES III B.Tech – VI Semester (Code: 18CS604)			
Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the operations of HTML & Web controls with tracing.
- Apply styles using validation controls and rich controls by applying state management.
- Do operations on the database with ADO.NET fundamentals and format the data with data controls.
- Learn the framework, working with web services by following MVC.

Course Outcomes: At the end of the course students will be able to

CO1	Interpret the operations of HTML & Web controls with tracing.
CO2	Implement styles using validation controls and rich controls by applying state management.
CO3	Operate the database with ADO.NET fundamentals and format the data with data controls.
CO4	Discuss framework, working with web services by following MVC.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO2	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO3	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO4	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3

UNIT-I — 15 Periods

The .NET Framework: C#, VB, and the .NET Languages, Intermediate languages, Common language runtime, the .NET class library.

Web Form Fundamentals: Understanding the anatomy of an ASP.NET application, Introducing server controls, improving the currency converter, taking a deeper Look at HTML control classes, using the page class, using Application events.

Web Controls: Stepping up to web controls, web control classes, List controls, Table controls, Web control events and AutoPostBack, An interactive web page.

Tracing: Enabling Tracing, Writing Trace Information, Performing Application-Level Tracing.

UNIT-II — 15 Periods

State Management: Understanding the problem of the state, using View State, Transferring information between pages, using cookies, managing session state Configuring session state, using application state

Validation: understanding the validation, using the validation controls.

Rich Controls: The calendar, The Ad Rotator, pages with multiple views: Multiview, Wizard Control.

Styles, Themes, and Master Pages: Styles, Themes, master page basics, advanced master pages.

UNIT-III — 15 Periods

ADO.NET Fundamentals: Understanding databases, configuring your database, Understanding SQL basics, Understanding the data provider model, using direct data Access, using disconnected data access. Data Binding: Introducing data binding, using single valued data binding, using repeated value data binding, working with data source controls. The Data Controls: The grid view, formatting the gridview, selecting a grid view row, Editing with a grid view row, sorting and paging in gridview, using grid view templates The details view and form view.	
UNIT-IV	15 Periods
LINQ and the Entity Framework: understanding LINQ, LINQ basics, using entity framework, Getting more advanced with entity framework, using the entity data source. Working with Services: What is WCF Web Service, Application for Creating and Consuming a WCF Web Service? Putting ASP.NET MVC in Context: Understanding the history of ASP.NET, Key Benefits of ASP.NET MVC. Your First MVC Application: Preparing Visual Studio, Creating a new ASP.NET MVC Project, Rendering Web Page, Creating a simple Data Entry Application.	
Text Book(s):	1. "Beginning ASP.NET 4.5 in C#", Matthew MacDonald, Apress Publishing Company. 2. "Professional ASP.NET 4.5 in C# and VB", Jason N. Gaylord,Christian Wenz , Pranav Rastogi, Todd Miranda, Scott Hanselman, John Wiley & Sons, Inc., Indianapolis, Indiana 3. "Pro ASP.NET MVC 5", Adam Freeman, Apress Publishing Company.
References:	1. "Microsoft Windows Communication Foundation Step by Step", john sharp, Microsoft Press.

MOBILE APPLICATION DEVELOPMENT

Department Elective-II

III B.Tech – VI Semester (Code:18CSD21)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the Android Application Architecture and Working.
- Understand how to develop android applications and internal working of applications
- Understand Intents, Broadcast Receivers, Preferences .
- Understand to develop android applications using Databases, Content Providers, Services & Menus.

Course Outcomes: At the end of the course students will be able to

CO1	Comprehend the concepts of android and fundamentals of android app development.
CO2	Design basic user interfaces using activities, layouts and fragments.
CO3	Develop android apps using Intents and Shared Preferences.
CO4	Develop Android apps using SQL LITE Databases, Content Providers &Services.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO2	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO3	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO4	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3

UNIT-I	15 Periods
Hello, Android, Getting Started	
UNIT-II	15 Periods
Creating Applications and Activities, Building User Interfaces	
UNIT-III	15 Periods
Intents and Broadcast Receivers, Using Internet Resources, Files, Saving State, and Preferences	
UNIT-IV	15 Periods
Databases and Content Providers, Working in the Background, Expanding the User Experience	

Text Book(s):	1. "Professional Android 4 Application Development", Reto Meier, John Wiley & Sons, Inc.
References:	1. "Android Programming The Big Nerd Ranch Guide", Brian Hardy & Bill Phillips, Big Nerd Ranch, Inc. 2. "Head First: Android Development", Dawn Griffiths & David Griffiths, O'Reilly Publications.

CLOUD PROGRAMMING

Department Elective-II

III B.Tech – VI Semester (Code:18CSD22)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the Cloud Computing environment, AWS platform, and AWS website service.
- Design cloud applications to demonstrate AWS services-EC2 and SQS.
- Make use of Amazon CLI, web interface and AWS SDK to develop applications and demonstrate the AWS services-Kinesis and S3.
- Develop applications using AWS SDK to work with the AWS services-RDS, NO SQL

Course Outcomes: At the end of the course students will be able to

CO1	Configure Eclipse with AWS SDK. Understand the basics of cloud computing and register with the AWS cloud platform.
CO2	Design cloud applications to demonstrate AWS services-EC2 and SQS.
CO3	Make use of Amazon CLI, web interface and AWS SDK to develop applications and demonstrate the AWS services-Kinesis and S3.
CO4	Develop applications using AWS SDK to work with the AWS services-RDS, NO SQL.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO2	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO3	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO4	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3

UNIT-I — 15 Periods

Introduction to Cloud Computing: Definition, 5-4-3 principles of Cloud Computing, Cloud Eco System, features of Cloud service, benefits and drawbacks, Cloud architecture, Anatomy of Cloud, Network Connectivity in Cloud Computing, Applications on the Cloud, Managing the Cloud, Migrating Application to Cloud.

Cloud Deployment and Service Models: Deployment Models, Service Models. Getting Started with AWS, Amazon CloudWatch

UNIT-II — 15 Periods

Hands-on Elastic Compute Cloud - Introduction to EC2, Features of EC2, EC2 Instance Types, Managing EC2 Using Management Console, Managing EC2 Using AWS CLI, Managing EC2 Using AWS SDK (Java), Monitoring Using CloudWatch.

Hands-on Simple Queue Service (SQS) - What Is Messaging Queuing Service? Introduction of AWS SQS, Features of SQS, Using AWS Management Console, Using AWS CLI, Using AWS SDK—Java, Monitor Using CloudWatch.

UNIT-III — 15 Periods

Hands-on Kinesis - Introduction to AWS Kinesis Stream and Firehose, Features, Using AWS Management Console, Using AWS CLI, Using AWS SDK—Java, Monitor Using CloudWatch. Hands-on Simple Storage Service (S3) - Introduction to AWS S3, Features, Using AWS Management Console, Using AWS CLI, Using AWS SDK - Java, Monitoring Using CloudWatch.	
UNIT-IV	15 Periods
Working with Data - using AWS RDS, using NoSQL Databases.Auto-scaling.	
Text Book(s):	1. Chandrasekaran, K. Essentials of cloud computing. CrC Press,2014. 2. Gulabani, Sunil. Practical Amazon EC2, SQS, Kinesis, and S3. Apress, 2017. 3. https://docs.aws.amazon.com/
References:	1. Wittig, Michael, Andreas Wittig, and Ben Whaley. Amazon web services in action. Manning, 2018. 2. Sarkar, Aurobindo, and Amit Shah. Learning AWS: Design, build, and deploy responsive applications using AWS Cloud components. Packt Publishing Ltd, 2018.

STATISTICS WITH R

Department Elective-II

III B.Tech –VI Semester (Code:18CSD23)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the fundamentals of statistical analysis in R environment.
- Analysis data for the purpose of exploration using Descriptive and Inferential Statistics.
- Students will understand Probability and Sampling Distributions.
- Learn the creative application of Linear Regression in multivariate context for predictive purpose.

Course Outcomes: At the end of the course students will be able to

CO1	List motivation for learning a programming Language.
CO2	Use R for statistical programming computation, graphics and modeling.
CO3	Explore datasets to create testable hypothesis and identify appropriate statistical tests.
CO4	Synthesize data to fit linear and nonlinear models.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	3	-	-	-	-	-	-	**3**	2	2	-
CO2	3	3	3	3	3	-	-	-	-	-	-	**3**	2	2	-
CO3	3	3	3	3	3	-	-	-	-	-	-	**3**	2	2	-
CO4	3	3	3	3	3	-	-	-	-	-	-	**3**	2	2	-

UNIT-I — 15 Periods

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets, - If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation- Extended Extended Example: A Binary Search Tree.

UNIT-II — 15 Periods

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writer Files, Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function ; Customizing Graphs, Saving Graphs to Files.

UNIT-III — 15 Periods

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, Testing of

Hypothesis (T-Test, F-Test, ANOVA Test).	
UNIT-IV	15 Periods
Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models- Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests	
Text Book(s):	1. The Art of R Programming, Norman Matloff, Cengage Learning 2. R for Everyone, Lander, Pearson
References:	1. R Cookbook, Paul Teetor, O'reilly. 2. R in Action, Robert Kabacoff, Manning

ARTIFICIAL INTELLIGENCE

Department Elective-III

III B.Tech – VI Semester (Code: 18CSD31)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- understand the fundamental concepts of artificial intelligence, and their environment, various Search techniques
- understand knowledge representation using predicate logic and rules
- understand the planning techniques.
- understand how to design and solve Learning techniques and Expert systems.

Course Outcomes: At the end of the course students will be able to

CO1	Comprehend the underlying ideas of artificial intelligence, as well as their environment and different search methods.
CO2	Acquire the skills to describe knowledge using rules and predicate logic.
CO3	Comprehend the planning methods.
CO4	Comprehend the design and resolution of Expert and Learning systems.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
CO2	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
CO3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
CO4	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3

UNIT-I — 16 Periods

Introduction to AI: What is AI? , Foundations of AI, History of AI, State of the Art. Intelligent Agents: Agents and Environments, Good Behavior: Concept of Rationality,The Nature of Environments And The Structure of Agents.

Solving Problems by Searching: Problem Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth First Search, Uniform Cost Search, Depth First Search, Iterative Deepening DFS and Bi-directional Search.

Informed (Heuristics) Search Strategies: Greedy BFS, A* Algorithm, Heuristics Functions.

Beyond Classical Search: Local Search Algorithms and Optimization Problems-Hill Climbing, Simulated Annealing, Searching with Non Deterministic Actions: AND-OR Graphs, Online Search Agents and Unknown Environments.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Local Search in CSPs, Structure of Problems.

UNIT-II — 15 Periods

Logical Agents: Knowledge Based Agents, The Wumpus World, Logic and Propositional Logic: Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and Backward chaining, Agents Based on Propositional Logic.
First Order Logic: Representation, Revisited Syntax and Semantics of First Order Logic, Using First Order Logic, Knowledge Engineering in First Order Logic.
Inferences in First Order Logic: Propositional vs. First Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.
Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

UNIT-III	15 Periods

Slot and Filler Structures
Semantic Nets, Conceptual Dependency, Scripts.
Planning
Overview - An Example Domain: The Blocks Word - Component of Planning Systems – Goal Stack Planning - Non-linear Planning using constraint posting Hierarchical planning,Reactive systems.

UNIT-IV	15 Periods

Learning
What is learning? Rote learning - Learning by taking advice learning in problem solving learning from example: Induction Explanation Based Learning.
Expert Systems
Representing and using domain knowledge Expert system shells Explanation Knowledge Acquisition.

Text Book(s):	1. Artificial Intelligence- A Modern Approach, Stuart Russell andPeter Norvig, 3rd Edition Pearson Education/ PHI.(UNIT-1&2) 2. Artificial Intelligence, 3rd Edn., E. Rich and K. Knight (TMH).(UNIT-3&4)
References:	1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning. 2. Introduction to Artificial Intelligence, Patterson, PHI 3. Artificial Intelligence, 3rd Edition, Patrick Henry Winston, Pearson Education. 4. Artificial Intelligence, Shivani Goel, Pearson Education. 5. Artificial Intelligence and Expert systems – Patterson, Pearson Education. 6. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5thed, PEA 7. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer 8. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

SOFTWARE PROJECT MANAGEMENT
Department Elective-III
III B.Tech – VI Semester (Code:18CSD32)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the fundamentals of modern software management, and difference from traditional software management.
- Discuss various process workflows, artifacts, and life cycle phases as well as diverse software architectures.
- Recognize the meaning of project milestones, organizational roles, and process automation.
- Understand the fundamentals of future software project management and various metrics and indicators.

Course Outcomes: At the end of the course students will be able to

CO1	Discover the fundamentals of modern software management, how it differs from traditional software management, and how to improve software economics.
CO2	Recognize various process workflows, artifacts, and life cycle phases as well as diverse software architectures.
CO3	Recognize the meaning of project milestones, organizational roles, and process automation.
CO4	Discover the fundamentals of future software project management and various metrics and indicators.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	-	-	-	3	3	3	2	3
CO2	3	3	3	-	3	-	-	-	-	-	3	3	3	2	3
CO3	3	3	3	-	3	-	-	-	-	-	3	3	3	2	3
CO4	3	3	3	-	3	-	-	-	-	-	3	3	3	2	3

UNIT-I — 15 Periods

Managing Software Projects: Processes and Project Management, Project Management and the CMM, Project Management at Infosys, Overview of the ACIC Case Study.
Process Planning: The Infosys Development Process, Requirement Change Management, Process Planning for the ACIC Project.
Effort Estimation and Scheduling: Estimation and Scheduling Concepts, Effort Estimation, Scheduling.

UNIT-II — 15 Periods

Quality Planning: Quality Concepts, Quantitative Quality Management Planning. Defect Prevention Planning. The Quality Plan of the ACIC Project. Risk Management: Concepts of Risks and Risk Management, Risk Assessment, Risk Control, Examples. Configuration Management: Concepts in Configuration Management, The Configuration Management Process, The ACIC Configuration Management Plan.	
UNIT-III	15 Periods
Measurement and Tracking Planning: Concepts in Measurement, Measurements, Project Tracking, The ACIC Measurement and Tracking Plan. The Project Management Plan: The Process databases, The Process capability baseline, Process assets and the body of knowledge system, The Project Management Plan, Team Management, Customer Communication and Issue Resolution, The Structure of the Project Management Plan, The ACIC Project Plan.	
UNIT-IV	15 Periods
Project Monitoring and Control: Project Tracking, Milestone Analysis, Activity-Level Analysis Using SPC, Defect Analysis and Prevention, Process Monitoring and Audit. Project Closure: Project Closure Analysis, The ACIC Closure Analysis Report.	
Text Book(s):	1. Software Project management in Practices by Pankaj Jalote, Pearson Education India (2015).
References:	1. Software Project Management by Bob Hughes, Mike Cotterell, Rajib Mall, McGraw Hill Education; 5th edition (2017). 2. Software Project Management: A Unified Framework by WalkerRoyce, Pearson Education (2002).

BLOCKCHAIN TECHNOLOGIES
Department Elective - III
III B.Tech – VI Semester (Code: 18CSD33)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Know the basic concepts of block chain technology.
- Understand the bitcoin network and alternative coins.
- Discuss the ethereum block chain and the steps to create block chain applications.
- Understand applications and challenges of block chain.

Course Outcomes: At the end of the course students will be able to

CO1	Understand the basic concepts of block chain technology.
CO2	Describe the bitcoin network and alternative coins.
CO3	Understand the ethereum block chain and the steps to create block chain applications.
CO4	Understand applications and challenges of block chain.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	3	-	-	-	-	-	2	-	3	3
CO2	3	3	3	-	-	3	-	-	-	-	-	2	-	3	3
CO3	3	3	3	-	-	3	-	-	-	-	-	2	-	3	3
CO4	3	3	3	-	-	3	-	-	-	-	-	2	-	3	3

UNIT-I — 16 Periods

Introduction, Structure of a Block, The Genesis Block, Linking Blocks in the Blockchain. Tiers of blockchain technology, Types of blockchain, Features of a blockchain Applications of blockchain technology

UNIT-II — 15 Periods

Bitcoin Bitcoin definition, Transactions, The transaction life cycle, The transaction structure, Types of transaction, Bitcoin network, Mining, Wallets Bitcoin payments, Bitcoin improvement proposals (BIPs) Alternative Coins, Namecoin, Litecoin, Primecoin, Zcash, Trading Zcash, Mining guide, Bitcoin installation, Bitcoin programming and the command-line interface, Bitcoin limitations , Privacy and anonymity

UNIT-III — 15 Periods

Hyperledger, a Linux Foundation Project, Ten Steps to Your First Blockchain application Ethereum Intr Contract creation transaction, Message call transaction Elements of the Ethereum blockchain, Ethereum virtual machine (EVM) Execution environment, Applications developed on Ethereum. oduction , Ethereum blockchain, The consensus mechanism ,The world state Transactions,	
UNIT-IV	15 Periods
Blockchain-Outside of Currencies: Internet of Things, Government, Health, Finance, Insurance, Media, Scalability and Other Challenges: Scalability, Proof of Stake, Privacy, Security, Benefits and limitations of blockchain.	
Text Book(s):	1. Mastering Blockchain, Packt Publishing by Imran Bashir 2. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas Antonopoulos 3. Blockchain, IBM Limited Edition, Published by John Wiley &Sons, Inc. www.wiley.com
References:	1. Blockchain by Melanie Swa, O'Reilly 2. Hyperledger Fabric - https://www.hyperledger.org/projects/fabric 3. Zero to Blockchain - An IBM Redbooks course, by Bob Dill, David Smits https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html

MACHINE LEARNING LAB
III B.Tech –VI Semester (Code:18CSL61)

Practicals :	3 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Learn a Regression Model
- Comprehend a Supervised Learning Model
- Apply Ensemble methods for improving the performance of a Learning Model
- Apply an Unsupervised Learning Model

Course Outcomes: At the end of the course students will be able to

CO1	Apply the correct regressions models for the given problems and implement it.
CO2	Analyze the suitable supervised learning model for the given problem and implement it.
CO3	Identify the suitable probabilistic learning model for the given problem and implement it.
CO4	Choose the correct clustering algorithm for the given problem and implement it.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3

LIST OF EXPERIMENTS

1. Write a program to implement the linear regression using stochastic gradient descent approach of training for a sample training data set stored as a .CSV file.
2. Write a program to implement the linear regression using Batch gradient descent approach of training for a sample training data set stored as a .CSV file.
3. Write a program to implement the Logistic regression for a sample training data set stored as a .CSV file and test the same using appropriate data sets
4. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply thisknowledge to classify a new sample.
5. Build an perceptron training model to learn linearly separable datasets and test the same using appropriate data sets.
6. Build an Artificial Neural Network by implementing the Back propagationalgorithm

and test the same using appropriate data sets.

7. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.
9. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions.
10. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the setof all hypotheses consistent with the training examples.

Text Book(s):	1. Tom M. Mitchell, "Machine Learning", First Edition, Mc. Graw Hill Publishing. 2. Python for Everybody, 2016 Edition by Charles R. Severance. 3. Introduction to Machine Learning with Python by Andreas C.Mueller and Sarah Guido, O'Reilly Media, Inc.
References:	1. Core Python Programming Paperback – 2016 by R. Nageswara Rao, Dreamtech Press. 2. Python Programming: A Modern Approach by Vamsi Kurama,Pearson. 3. Machine Learning in Python by Michael Bowles, Wiley.

MIDDLEWARE TECHNOLOGIES LAB III B.Tech –VI Semester (Code:18CSL62)			
Practicals :	3 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the operations of HTML & Web controls with tracing.
- Apply styles using validation controls and rich controls by applying state management.
- Do operations on the database with ADO.NET fundamentals and format the data with data controls.
- Learn the framework, working with web services by following MVC.

Course Outcomes: At the end of the course students will be able to

CO1	Execute applications using HTML & Web controls with tracing.
CO2	Implement applications on rich controls and validation controls with state management.
CO3	Interpret the applications on ADO.NET fundamentals for matching data with data controls.
CO4	Solve the applications on framework and web services by following MVC.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3

LIST OF EXPERIMENTS

1. Design an ASP.NET application to demonstrate Web Form markup and redirection.
2. Design an ASP.NET application to demonstrate Web Controls and Html controls.
3. Design an ASP.Net application to demonstrate List Controls and to display a table dynamically.
4. Design an ASP.Net application to demonstrate Cross page Postback andQueryString to transfer data between Web pages.
5. Design an ASP.Net application to demonstrate the use of Cookies and using cookies how to transfer data between web pages.
6. Design an ASP.Net application to demonstrate use of session state and using session state how to transfer data between Web Pages.
7. Design an ASP.NET application to demonstrate Validating ASP.NET Web Pages using Validation Controls.

8. Design an ASP.NET application to demonstrate Rich Controls. 9. Design an ASP.NET Web Site with Styles, Themes and Master Pages. 10. Design an ASP.NET application to work with SQL Server Database using ADO.NET. 11. Design an ASP.NET application to work with SQL Server Database using Data Controls. 12. Design an ASP.NET application to work with SQL Server Database using LINQ Queries. 13. Design an application to demonstrate a Web Service Creation and Consumption. 14. Design a Simple MVC Web Pages Application.	
Text Book(s):	1. "Beginning ASP.NET 4.5 in C#", Matthew MacDonald, Apress Publishing Company. 2. "Professional ASP.NET 4.5 in C# and VB", Jason N. Gaylord,Christian Wenz , Pranav Rastogi, Todd Miranda, Scott Hanselman, John Wiley & Sons, Inc., Indianapolis, Indiana 3. "Pro ASP.NET MVC 5", Adam Freeman, Apress Publishing Company.
References:	1. "Microsoft Windows Communication Foundation Step by Step", john sharp, Microsoft Press.

MOBILE APPLICATION DEVELOPMENT LAB

Dept. Elective-II Lab

III B.Tech – VI Semester (Code: 18CSLD21)

Practicals :	3 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the Android Application Architecture and Working.
- Understand how to develop android applications and internal working of applications.
- Understand Intents, Broadcast Receivers, Preferences.
- Understand to develop android applications using Databases, Content Providers, Services & Menus.

Course Outcomes: At the end of the course students will be able to

CO1	Create an Environment to develop Android applications.
CO2	Design user Interfaces using Activities, Layouts & Fragments.
CO3	Develop Android apps using Intents and shared preferences.
CO4	Develop Android apps using SQL LITE Databases, Content Providers & Services.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3

LIST OF EXPERIMENTS

1. Downloading and Installing the Android SDK. Downloading and Installing Updates to the SDK.
2. Creating and understanding Hello World application.
3. Develop an Android application to demonstrate the usage of resources and animations.
4. Develop an Android application to demonstrate Activity lifecycle.
5. Develop To-Do List Android application to demonstrate Different LayoutManagers.
6. Develop an Android application to create and use custom controls.
7. Develop an Android application to demonstrate Intents.
8. Develop Earthquake Viewer Android application to demonstrate the usage ofInternet Resources.
9. Develop an Android application to demonstrate working with SQLITE Databases.

10. Develop Earthquake-Monitoring Service.	
Text Book(s):	1. "Professional Android 4 Application Development", Reto Meier, John Wiley & Sons, Inc.

CLOUD PROGRAMMING LAB

Dept. Elective-II Lab

III B.Tech – VI Semester (Code: 18CSLD22)

Practicals :	3 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the Cloud Computing environment, AWS platform, and AWS website service.
- Design cloud applications to demonstrate AWS services-EC2 and SQS.
- Make use of Amazon CLI, web interface and AWS SDK to develop applications and demonstrate the AWS services-Kinesis and S3.
- Develop applications using AWS SDK to work with the AWS services-RDS, NO SQL

Course Outcomes: At the end of the course students will be able to

CO1	Configure Eclipse with AWS SDK. Understand the basics of cloud computing and register wit the AWS cloud platform.
CO2	Design cloud applications to demonstrate AWS services-EC2 and SQS.
CO3	Make use of Amazon CLI, web interface and AWS SDK to develop applications and demonstrate the AWS services-Kinesis and S3.
CO4	Develop applications using AWS SDK to work with the AWS services-RDS, NO SQL.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3

LIST OF EXPERIMENTS

1. Creating an AWS Account. Setting up a key pair. Creating a billing alarm.
2. Demonstrate managing EC2 using Management Console.
3. Demonstrate managing EC2 Using AWS CLI.
4. Develop an application to manage EC2 Using AWS SDK(Java).
5. Demonstrate managing SQS using Management Console.
6. Demonstrate managing SQS using AWS CLI.
7. Develop an application to manage SQS using AWS SDK(Java).
8. Demonstrate managing Kinesis using Management Console.
9. Demonstrate managing Kinesis using AWS CLI.
10. Develop an application to manage Kinesis using AWS SDK(Java).

11. Demonstrate managing S3 using Management Console. 12. Demonstrate managing S3 using AWS CLI. 13. Develop an application to manage S3 using AWS SDK(Java). 14. Develop an application using Amazon Relational Database Service (RDS). 15. Develop an application using NoSQL Database.	
Text Book(s):	1. Gulabani, Sunil. Practical Amazon EC2, SQS, Kinesis, and S3.Apress, 2017. 2. https://docs.aws.amazon.com/ 3. Wittig, Michael, Andreas Wittig, and Ben Whaley. Amazon web services in action. Manning, 2018.

STATISTICS WITH R LAB
Dept. Elective-II Lab
III B.Tech – VI Semester (Code:18CSLD23)

Practicals :	3 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the fundamentals of statistical analysis in R environment.
- Analysis data for the purpose of exploration using Descriptive and Inferential Statistics.
- Students will understand Probability and Sampling Distributions.
- Learn the creative application of Linear Regression in multivariate context for predictive purpose.

Course Outcomes: At the end of the course students will be able to

CO1	Understand the basics of R. Understand the installation of R language and installation of required packages. Write commands for mathematical calculations, vectors, matrices, data frames and Arrays. Write programs using functions.
CO2	Write R programs fpr reading and writing CSV and excel files in R environment and manipulate data using SQL.
CO3	Analyze the data for various formats to see the data. Use various plots for visualization of data.
CO4	Understand statistics and linear models. Understand searching text patterns using regular expressions.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3

LIST OF EXPERIMENTS

1. a). Write R Code using R as a calculator.b).

   Write R Code on Vector Operation.

   c). Write R code which demonstrate i) Array ii) List iii) Matrix iv) stack v) Data Frames
2. Write R Code to Importing & Exporting data from i) CSV file ii) Excel file
3. Write R code Which Demonstrate i) Missing Value Treatment ii) Outliers
4. Write R code to demonstrate i) Character functions ii) SQL operations using R.

5. Write R code which demonstrate functions and control loops.
6. Write R code which demonstrate plotting of graphs i) Histogram ii) Pie Graph iii) Plot Graph iv) Box Plot v) Dot Plot vi) Kernel Density Plots
7. Write R code which demonstrates descriptive statistical functions.
8. Write R code which demonstrates frequency and contingency tables.
9. Write R code which demonstrates Correlations.
10. Write R code which demonstrates T-Tests (Independent and Dependent).
11. Write R code which demonstrates Nonparametric tests of group differences.
12. Write R code which demonstrates i) Simple Linear Regression ii) Multiple Linear Regression
13. Write R code which demonstrates One-way ANOVA.
14. Write R code which demonstrates Two-way factorial ANOVA.

Text Book(s):	1. R for Everyone, Lander, Pearson. (UNIT-I) 2. R in Action, Robert Kabacoff, Manning. (UNIT-II, III, and IV)
References:	1. R Cookbook, Paul Teetor, O'reilly. 2. The Art of R Programming, Norman Matloff, Cengage Learning.

FULL STACK DEVELOPMENT
IV B.Tech – VII Semester (Code: 18CS701)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Develop a WEB-API using Node.JS.
- Work with NOSQL databases like MongoDB.
- Develop a front-end in Angular that consumes web-services.
- Develop a responsive front-end in Angular

Course Outcomes: At the end of the course students will be able to

CO1	Utilize Listeners, Timer Events, and Callbacks. Use Node.js to implement HTTP services and access the File System and Develop an express web applications using routes, and templating.
CO2	Understanding middleware, utilizing express to implement cookies, sessions, and authentication Use Node.js to implement CRUD operations by connecting to MongoDB.
CO3	Understanding and implementing applications using typescript, creating applications using components and expressions using angular.
CO4	Create Angular components, events with data binding and Angular services.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO2	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO3	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3
CO4	3	2	3	-	3	-	-	-	-	-	-	2	3	3	3

UNIT-I — 15 Periods

Getting Started with Node.js, Using Events, Listeners, Timers, and Callbacks in Node.js, Handling Data I/O in Node.js, Accessing the File System from Node.js, Implementing HTTP Services in Node.js, Express with Node.js, Routes, Request and Response objects, Template engine.

UNIT-II — 15 Periods

Understanding middleware, Query middleware, Serving static files, Handling POST body data, Cookies, Sessions, Authentication. Understanding NoSQL and MongoDB, Getting Started with MongoDB, Getting Started with MongoDB and Node.js, Manipulating MongoDB Documents from Node.js, Accessing MongoDB from Node.js.

UNIT- III — 15 Periods

Typescript- types, interfaces, classes, modules, functions, Angular- understanding Angular, separation of responsibilities, Angular CLI, Basic Angular application, Components, Expressions,

UNIT-IV — 15 Periods

Data binding, Built-in directives, Events and change detection- Browser events, Custom events, Observables, Angular services- Understanding Angular services, Built-in services, GET and PUT Requests, A simple mock server, Changing views with the router service.	
Text Book(s) :	1. Node.js, MongoDB and Angular Web Development (Second Edition), Brad Dayley, Brendan Dayley Caleb Dayley, by PearsonEducation, Inc.
References :	1. Getting MEAN with Mongo, Express, Angular, and Node, Manning Publications, ISBN-10 : 1617294756, 2. Beginning Node.js, Express & MongoDB Development, ISBN-10 : 9811480281, 3. Beginning Node.js, Basarat Syed, APress, ISBN- 10: 9781484201886

WIRELESS NETWORKS

IV B.Tech – VII Semester (Code: 18CS702)

Lectures	:	4 Periods/week, Tutorial:1	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the fundamentals of the wireless communications systems, the wireless network architectures, protocols, and applications.
- Understand architecture of different telecommunication systems and satellite systems.
- Understand architecture and layers of wireless local area networks and network layer for wireless environment.
- Understand network architectures of 4G Technology Advancements.

Course Outcomes: At the end of the course students will be able to

CO1	Develop the foundation for the need of wireless networks and recognize the features of the multiple access mechanisms used in mobile communication, as well as the mobile communication systems.
CO2	Learn the fundamentals, routing, and localization of satellite navigation systems as well as the 2G, DECT, TETRA, UMTS, and LTE mobile communication systems.
CO3	Learns about the design and protocols of wireless LANs, as well as the mobile network layer and routing algorithms for ad hoc networks.
CO4	Find out more about the mobile transport layer. learns about the wireless application protocol's architecture.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
CO2	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
CO3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
CO4	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3

UNIT-1 — 15 Periods

Introduction: Applications, Short History of Wireless Communications, Simplified Reference Model. Wireless Transmission: Frequencies, Signals, Signal Propagation, Multiplexing, Modulation, SpreadSpectrum, and Cellular Systems.
Medium Access Control: Motivation for a Specialized MAC, SDMA, FDMA, TDMA, CDMA, andComparison.

UNIT-2 — 15 Periods

Telecommunication Systems: GSM, DECT, TETRA, UMTS and IMT-2000: System Architecture, and Radio Interface. Satellite Systems: History, Applications, Basics, Routing, Localization, and Handover

UNIT-3 — 15 Periods

Wireless LAN: Infrared Vs. Radio Transmission, Infrastructure and Ad Hoc Networks, IEEE 802.11: SystemArchitecture, Protocol Architecture, Physical Layer, MAC Layer, and MAC Management.
Mobile Network Layer: Mobile IP: Entities and Terminology, IP packet delivery, Agent

discovery,Registration, and Tunneling and Encapsulation, Dynamic Host Configuration Protocol.	
UNIT-4	15 Periods
Mobile Network Layer: Ad Hoc Networks. Mobile Transport Layer: Traditional TCP, Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit / Fast Recovery, Transmission / Time-Out Freezing, Selective Retransmission, and Transaction Oriented TCP. Support for Mobility: Wireless Application Protocol: Architecture, Wireless Datagram Protocol, Wireless Transport Layer Security, Wireless Transaction Protocol, Wireless Session protocol, and Wireless ApplicationEnvironment.	
Text Books :	1. Jochen.Schiller, "Mobile communications", second edition, Addison-Wesley, 2003. 2. Farooq Khan, "LTE for 4G Mobile Broadband" Line-Air Interface Technologies and Performance, CAMBRIDGE, 2009. 3. Jonathan Rodriguez, "Fundamentals of 5G Mobile Networks", WILEY, 2015.
References :	1. William Stallings, "Wireless Communication Networks". UWE Hansmann, Lother Merk, Martin S.Nicklous, Thomas Stober, "Principles of Mobile Computing", 2nd Edition.

INSTITUTIONAL ELECTIVE - I (Common for all branches) IV B.Tech – VII Semester (Code: 18__I__)			
Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks
List of the Subjects			
18CEI01	Air Pollution & Control		
18CEI02	Rural Water Supply And Environment Sanitation		
18CSI01	Java Programming		
18CSI02	Database Management System		
18ECI01	Digital Image Processing		
18ECI02	Embedded Systems		
18EEI01	Application of Wavelets to Engineering Problems		
18EEI02	Industrial Electrical Systems		
18EII01	Principles & Applications of MEMS		
18EII02	Power Plant Instrumentation		
18ITI01	Introduction to Data Analytics		
18ITI02	Cyber Security		
18MEI01	Fluid Power and Control Systems		
18MEI02	Project Management		
18MAI01	Linear Algebra		
18PHI01	Nano-Materials and Technology		
18PHI02	Fiber Optics Communications		
More Details Please refer Annexure 1			

CYBER SECURITY
Department Elective-IV
IV B.Tech–VII Semester (Code: 18CSD41)

Lectures	:	4 Periods/week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- To make the students familiar with Security services and Security mechanisms and Hacking phases.
- Understand about Security in the networks how to analyze.
- Understand how to secure computer system with using various techniques.
- Gather the matter about how to secure applications in the computer system

Course Outcomes: At the end of the course students will be able to

CO1	Install the different Tools (VMWare, Kali Linux, Windows OS, Metasploitable2, Veil frame work and DVWA), practice the hacking & gathering information of a system using metasploit frame work and meterpreter shell commands
CO2	Recognize and employ information gathering tools and cyber security attacks.
CO3	Test the Web application hijacking tools, Passwords Cracking and wireless network attacking tools.
CO4	Analyze the intrusions, Incidents and disk

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2	3	-	3	3	-	3	-	-	-	2	2	2	2
CO2	2	2	3	-	3	3	-	3	-	-	-	2	2	2	2
CO3	2	2	3	-	3	3	-	3	-	-	-	2	2	2	2
CO4	2	2	3	-	3	3	-	3	-	-	-	2	2	2	2

UNIT-1 — 16 Periods

Installing & Basic Over View: Installing kali with VM ware player, updating kali, Installing VM ware Tools for Linux, installing Metasploit able 2, Installing Windows OS, Installing Veil frame work, Installing DVWA.
Metasploit Tutorial: Introduction to metasploit: Metasploit overview, picking an exploit, Setting exploit options, Multiple Target types, Picking a payload, Setting payload options, Running the exploit
Meterpreter Shell: Basic Meterpreter Commands, Core commands, File system Commands, Network Commands, System Commands, Capturing Webcam Video, Screen shots.

UNIT-2 — 14 Periods

Information Gathering & Mapping: Recon Tool, Dmitry, netdiscover, nmap, Zenmap, Nessus.
Viruses, malware, Trojan, Types of cyber security attacks: malware, phishing, SQL injection attack(sqlmap), cross-site scripting, denial of service, session hijacking and man-in- the middle attacks.

UNIT-3 — 16 Periods

Web application hijacking tools- Burp suite, OWASPZAP.

Web based password cracking Techniques: Introduction, Authentication Techniques, password cracking: definition, password cracking Tolls and techniques. Wireless Network Attacks: Wireless Security Protocols, Using MacChanger to Change the Address (MAC) of your Wi-Fi Card, Fern WIFI Cracker, aircrack-ng, Wi-Fi Testing with WiFite, Kismet: Scanning with Kismet, Analysing the Data.	
UNIT-4	14 Periods
Troubleshooting and configuring of network devices: Firewalls-what is firewall, packet, traffic, protocol, port, tool: IPtables (rules), IDS and IPS: what is IDS and IPS, installation procedure for snort, snort rules. Incident Response: What is IR, Need for IR, Goals of IR.? IR Methodologies: Based on procedure: Phases of IR, Pre-incident Preparation, Detection and Analysis, Containment, Eradication and Recovery, Post Incident Activity. Based on Artifacts: Investigating Unix Systems. Disk analysis: FTK imager.	
References :	1. Basic Security Testing with Kali Linux -Daniel W. Dieterle 2. hacking exposed web applications - JOEL SCAMBRAY MIKE SHEMA

INTERNET OF THINGS

Department Elective-IV

IV B.Tech–VII Semester (Code: 18CSD42)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: Basic Knowledge of Hardware and Programming

Course Objectives: Students will be able to

- Make the students to know the IoT challenges and architectures.
- Provide an understanding of the technologies and the standards relating to the Internet of Things.
- Understanding the concept of M2M (machine to machine) with necessary protocols.
- Design and develop skills on IoT applications.

Course Outcomes: At the end of the course students will be able to

CO1	Recognize the fundamentals of the IoT's logical and physical design.
CO2	Acquire skills required for development of IoT applications.
CO3	Design of the IoT applications based on M2M and design methodology
CO4	Create the IoT applications for real time problems

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	-	3	-	3	-	-	-	-	-	-	2	2	-	-
CO2	2	-	3	-	3	-	-	-	-	-	-	2	2	2	
CO3	2	-	3	-	3	-	-	-	-	-	-	2	2	-	-
CO4	2	-	3	-	3	-	-	-	-	-	-	2	2	2	-

UNIT-1 (15 Hours)

Introduction to IoT:
The flavour of the IoT, the technology of the IoT, characteristics of IoT, physical design of IoT,logical design of IoT, IoT enabling technologies, IoT levels & deployment templates

UNIT-2 (15 Hours)

Elements of IoT:
Hardware Components-Computing (Arduino, Raspberry Pi), Sensors, Actuators, I/O interfaces,Communication Protocols (ZigBee, Bluetooth, 6LoPAN, and MQTT), Software Components- Programming API"s (using Python/Arduino).

UNIT-3 (15 Hours)

M2M and IoT Design Methodology:
M2M, Differences and Similarities between M2M and IoT, IoT Design Methodology.

UNIT-4 (15 Hours)

Cloud for IoT and Case Studies: Introduction, IoT with Cloud – Challenges, Selection of CloudService Provider for IoT Applications, Introduction to Fog Computing, Cloud Computing: Security Aspects,
Case Studies: Smart Lighting, Home Intrusion Detection, Smart Parking, Weather Monitoring System, Smart Irrigation, and Adafruit Cloud

Text Books:	1. Internet of Things: A Hands-on-Approach‖, Arsh deep Bahga, Vijay Madisetti, VPT, 1st Edition, 2014. 2. Internet of Things, Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram, John Wiley & Sons. 1st edition, 2019. 3. Designing the Internet of Things, Adrian McEwen, Hakim Cassimally, JohnWiley and Sons, 1st Edition, 2014. 4. Internet of Things: Architecture and Design, Raj Kamal, McGraw Hill Education; 1st edition, 2017.
References :	1. Jeeva Jose, "Internet of Things", Khanna Publishing, 1st edition, 2018. 2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things:key applications and Protocols", Wiley, 1st edition, 2015.

BIG DATA ANALYTICS

Department Elective - IV

IV B.Tech – VII Semester (Code: 18CSD43)

Lecture:	4 Periods/Week	Continuous Internal Assessment:	50 Marks
Final Exam :	3 hours	Semester End Exam:	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understanding Big data, Hadoop and Hadoop Distributed File System.
- Understanding YARN(Yet Another Resource Node), Map Reduce mechanism.
- Understanding PIG, HIVE.
- Understanding SQOOP, SPARK.

Course Outcomes: At the end of the course students will be able to

CO1	Identify Hadoop, the distributed file system in Hadoop, and big data.
CO2	Recognize the Map Reduce and YARN (Yet Another Resource Node) mechanisms.
CO3	Integrate PIG and HIVE.
CO4	Recognize SQOOP and SPARK.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO2	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3

UNIT-I — 15 Periods

UNDERSTANDING BIG DATA: What is big data? Why big data? Data!, Data Storage and Analysis, Comparison with Other Systems, Rational Database Management System, Grid Computing, Volunteer Computing, convergence of key trends, Unstructured Data.

INDUSTRY EXAMPLES OF BIG DATA: Web Analytics, Big Data and Marketing, Fraud andBig Data, Risk and Big Data - Credit risk management, Big Data and Algorithmic Trading, Big Data and Healthcare – Big data in medicine, Advertising and big data.

BIG DATA TECHNOLOGIES: Introduction to Hadoop, Open Source Technologies - Cloud and Big Data, Mobile Business Intelligence, Crowd sourcing analytics, Inter and Trans firewall analytics.

UNIT-II — 15 Periods

BASICS OF HADOOP: Introduction to Hadoop, hadoop components, Configuration of Hadoop, Data format, Aanalyzing data with Hadoop, Scaling out, Hadoop streaming.

Hadoop Distributed File System: Design of HDFS, HDFS concepts, Command line interpreter, Basic File system operations, Hadoop File System Interface, Data Flow, Parallel copying with distcp, Java interface.

UNIT-III — 15 Periods

How MapReduce Works: Classic Map Reduce, Anatomy of Map Reduce job run, Failure inMap Reduce, Shuffle and sort, Task execution.

Mapreduce Features: Counters, Sorting, Writing mapreduce programs, Deploying mapreduce programs on Hadoop Cluster.

YARN-Anatomy of YARN application run, YARN compared to Mapreduce 1,

Scheduling inYARN, Failures In YARN.	
UNIT-IV	15 Periods
Hadoop Related Tools: Pig- Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts,User-Defined Functions-A Filter UDF, An Eval UDF. Hive: Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries. Sqoop: Getting Sqoop, Sqoop Connectors, A Sample Import, Text and Binary File Formats, Generated Code, Additional Serialization Systems, Imports: A Deeper Look, Controlling theImport, Imports and Consistency	
Text Book(s) :	1. HADOOP "The Definitive Guide", Tom White, O'Reilly Publications, 4th Edition.
References :	

CONSTITUTION OF INDIA IV B.Tech – VII Semester (Code : 18CS705)			
Lecture:	2 Periods	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able

- To understand the importance of the Constitution in a Democratic Society.
- To Understand to Fundamental Rights and make the best use of them and the duties of a citizen and discharge his duties and became a good citizen.
- To know the judicial supremacy and independence of Judiciary and fight for his legitimate Right through Court of Law.
- To participate in Nation building activities and be away from destructive outfits and in the democratic process of governance.

Course Outcomes: At the end of the course students will be able to

CO1	Know how crucial the Constitution is to a democratic society.
CO2	Understand the Fundamental Rights and make the best use of them and the duties of a citizen and discharge his duties and became a good citizen.
CO3	Know about Judicial supremacy and Independence of judiciary and fight for his legitimate Rights through court of law.
CO4	Participate in nation building activities and be away from destructive outfits and in the democratic process of governance.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	-	3	-	-	-	-	-	2	-	-	-
CO2	-	-	-	-	-	3	-	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	3	-	-	-	-	-	2	-	-	-
CO4	-	-	-	-	-	3	-	-	-	-	-	2	-	-	-

UNIT-I	8 Periods

Meaning of the constitutional law and constitutionalism.
Historical perceptive of the constitution of India
Salient features and characteristics of the constitution of India.
Preamble, union and its territory and citizenship.

UNIT-II	8 Periods

Fundamental rights principles.
Directive principles of state policy.
Fundamental Duties.
The government of the union, the president, The Prime Minister, and the council of ministers, The parliament of India, The supreme court, the union judiciary

UNIT-III	8 Periods

The Machinery of Government in the states, The Governor, The Chief Minister and council of Ministers, The State legislature, High court, Judiciary in the states Union territories. The Federal System, Division of powers between centre and states, Legislative Administration and financial relation. Emergency Provisions, President Rule, National Emergency, Financial Emerging Local self Government, Panchayat Raj, Municipalities and municipal Corporation	
UNIT-IV	8 Periods
Local self Government, Panchayat Raj, Municipalities and municipal Corporation Miscellaneous Provisions, The comptroller and Auditor general of India, The Public Service Commission, Special Provisions relating to certain classes, Elections – Political parties. Amendment of the Constitution.	
References :	1. Constitutional Government in India – M V Pylee – Asia Publishing House 2. Indian Government and Politics – D C Dasgupta. Vikas Publishing house 3. The Oxford Hand Book of the Indian Constitution, Sujit Chowdary, Madhav Khosla Pratapabhem Mehla. 4. Constitutional question in India ; The President , Parliament and the States – Noorani A G – Oxford. 5. Indian Constitution and its features – Astoush Kumar, Anmol Publishers 6. The Constitution of India – Bakshi P M – Universal Law Publishers 7. Legelect's the constitution of India – Ramnarain Yadav, K K Legelest Publication

UNIFIED MODELING LANGUAGE LAB
IV B.Tech – VII Semester (Code : 18CSL71)

Lectures	:	3 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Able to prepare problem statement and SRS (software requirements specification) document.
- Able to develop various analysis modeling diagrams.(use-case, activity, class etc.)
- Able to develop various design representations (component diagrams and deployment diagrams)
- Able to perform various testing techniques (black box and white box)

Course Outcomes: At the end of the course students will be able to

CO1	Analyze Software Requirements for the given Software Application.
CO2	Develop the UML Diagrams to view Software System in Static and Dynamic Aspects.
CO3	Describe the dynamic behaviour and structure of the design.
CO4	Comprehend overall system design.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3

Requirements Capture: User Requirements, Fact Finding Techniques, User Involvement, Documenting Requirements, Use Cases, and Requirements Capture and Modelling; Designing Classes, The Class Diagram Revisited.

Object Interaction: Object Interaction and Collaboration, Interaction Sequence Diagrams, Collaboration Diagrams, Model Consistency;

Modeling Concepts: Models and diagrams, Drawing Activity Diagrams, States and Events, Basic Notation, Further Notation, preparing a State chart, Consistency Checking, Qualify Guidelines, A Development Process;

Design: Logical and Physical Design, System Design and Detailed Design, Qualities and objectives of Analysis and Design, Measurable Objectives in Design, Planning for Design. Concurrency, Processor Allocation, Data Management Issues, Development Standards, Prioritizing Design Trade-offs, Design for Implementation;

Implementation: Software Implementation, Component Diagrams, Development Diagrams, Software Testing, Data Conversion, User Documentation and Training, Implementation Strategies, Review and Maintenance; Reusable Components: Why Reuse?, Planning a Strategy for Reuse, Commercially Available component ware

LIST OF EXPERIMENTS	
1. Identify a software system that needs to be developed 2. Document the Software Requirements Specification (SRS) for the identified system. 3. Identify use cases and develop the Use Case model. 4. Identify the conceptual classes and develop a Domain Model and also derive a ClassDiagram from that. 5. Using the identified scenarios, find the interaction between objects and represent them usingUML Sequence and Collaboration Diagrams 6. Draw relevant State Chart and Activity Diagrams for the same system. 7. Implement the system as per the detailed design 8. Test the software system for all the scenarios identified as per the use-case diagram 9. Improve the reusability and maintainability of the software system by applying appropriatedesign patterns. 10. Implement the modified system and test it for various scenarios.	
Text book:	1. "Object-Oriented Systems Analysis And Design Using UML", Simon Bennett, SteveMcRobb and Ray Farmer, Tata McGraw-Hill Edition, Third Edition.

FULL STACK DEVELOPMENT LAB
IV B.Tech – VII Semester (Code : 18CSL72)

Practicals	:	3 Periods / Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: Web Technologies Lab.

Course Objectives: Students will be able to

- Develop a WEB-API using Node.JS.
- Work with NOSQL databases like MongoDB
- Develop a front-end in Angular that consumes web-services
- Develop a responsive front-end in Angular

Course Outcomes: At the end of the course students will be able to

CO1	Utilize Listeners, Timer Events, and Callbacks. Use Node.js to implement HTTP services and access the File System and Develop an express web applications using routes, and templating.
CO2	Understanding middleware, utilizing express to implement cookies, sessions, and authentication Use Node.js to implement CRUD operations by connecting to MongoDB.
CO3	Understanding and implementing applications using typescript, creating applications using components and expressions using angular.
CO4	Create Angular components, events with data binding and Angular services.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	-	3	-	-	2	-	2	-	3	3	3	3

LIST OF EXPERIMENTS

1. Write programs
   a. to implement timers.
   b. to demonstrate different ways of performing read/write operations in local filesystem.
2. Write programs
   a. to implement buffer operations.
   b. to demonstrate different ways of performing stream operations.
3. Code
   a. a basic Node.JS user registration application.
   b. an Express application for user registration
4. Create a CRUD application using data from local file system.
5. Create a MongoDB application to create CRUD operations
6. Create a CRUD application using data from MongoDB server.
7. Refactor the above program to separate
   a. Model operations
   b. Controller operations
8. Code Angular applications to demonstrate

a. Data binding. b. Directives c. Data sharing between parent/child components. 9. Create an Angular CRUD application that interacts with a REST API.	
Text Books :	Node.js, MongoDB and Angular Web Development (Second Edition), BradDayley, Brendan Dayley Caleb Dayley, by Pearson Education, Inc.
References :	1. Getting MEAN with Mongo, Express, Angular, and Node, Manning Publications, ISBN-10 : 1617294756, 2. Beginning Node.js, Express & MongoDB Development, ISBN-10 : 9811480281, 3. Beginning Node.js, Basarat Syed, APress, ISBN-10: 9781484201886

CYBER SECURITY LAB IV B.Tech – VII Semester (Code: 18CSLD41)					
Practicals	:	3 Periods / Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite:

Course Objectives: Students will be able to

- Learn the Installations of different Tools (VMWare, Kali Linux, Windows OS, Metasploitable2, Veil frame work and DVWA).
- Understand the usage of Information Gathering and MITMF tools. Learn how to detect/prevent intrusions in system by using snort and configuring firewall Settings using IPtables,
- Learn how to hack a system and gathering information of a system using metasploit frame work and meterpreter shell commands, mechanisms for cracking passwords and wireless network attacks.
- Understand the usage of the Web application hijacking tools, DOS, Sql-injection, XSS and Phishing attacks.

Course Outcomes: At the end of the course students will be able to

CO1	Install the different Tools (VMWare, Kali Linux, Windows OS, Metasploitable2, Veil framework and DVWA),practice the hacking and gathering information of a system using metasploit framework and meterpreter shell commands.
CO2	Recognize and employ information gathering tools and cyber security attacks.
CO3	Test the Web application hijacking tools, Passwords Cracking and wireless network attacking tools.
CO4	Analyze the intrusions, Incidents and disk

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2	3	-	3	3	-	2	-	2	-	2	2	2	2
CO2	2	2	3	-	3	3	-	2	-	2	-	2	2	2	2
CO3	2	2	3	-	3	3	-	2	-	2	-	2	2	2	2
CO4	2	2	3	-	3	3	-	2	-	2	-	2	2	2	2

LIST OF EXPERIMENTS

a. Installations:- VM-ware, kali, windows OS, metaspotiable-2, Veil frame work & DVWA.

b. Hacking any windows OS by using msfconsole.

c. Information gathering tools-recontool, Dmitry, netdiscovery, nmap, zenmap.

d. Installation procedure and usage of nessus.

e. Phishing attacks with Setoolkit.

f. Sql-injection, Xssattack, denial of service attack, session hijacking.

g. Burpsuit and owaspzap tool.

h. Password Attacks:-

   i. Online Password Cracking with hydra, xhydra.

ii. Offline Password Cracking with John the ripper.

i. Wireless Network attacks:-
   i. Aircrack-NG.
   ii. Fern Wi-Fi cracker
   iii. WiFite.
   iv. Mac changer.

j. Linux Firewall rules configuraton by Iptables

k. Snort installation and usage in
   i. Packet Sniffer mode
   ii. Packet Logger mode
   iii. IDS mode
   iv. IPS mode

l. Incident Response: Investigating UNIX System

m. Disk Analyzer: FTK Imager.

References :	1. Basic Security Testing with Kali Linux -Daniel W. Dieterle 2. hacking exposed web applications - JOEL SCAMBRAY MIKE SHEMA

INTERNET OF THINGS LAB
IV B.Tech – VII Semester (Code: 18CSLD42)

Practicals	:	3 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite:

Course Objectives: Students will be able to

- Hands on practice on IoT hardware and software platforms, microcontrollers and single board computers.
- Detailed study and interfacing of sensors, actuators and communication modules to microcontrollers and single board computers.
- Analyze the Application areas of IoT.
- Development of different IoT applications.

Course Outcomes: At the end of the course students will be able to

CO1	Analyze the application area of IOT.
CO2	Realize the evolution of Internet in mobile device and cloud network.
CO3	Analyze the building blocks of IOT and characteristics.
CO4	Design and develop IOT application for the given specific problem.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	-	3	-	3	-	-	2	-	2	-	2	2	-	-
CO2	2	-	3	-	3	-	-	2	-	2	-	2	2	2	
CO3	2	-	3	-	3	-	-	2	-	2	-	2	2	-	-
CO4	2	-	3	-	3	-	-	2	-	2	-	2	2	2	-

LIST OF EXPERIMENTS

Week #	Name of the Experiment	Specific Requirements
1.	Arduino Uno Development Kit: Familiarization with Arduino Uno hardware, software, and perform necessary software installation.	Arduino Uno hardwareand software platforms
2.	Outputting Digital Signal: a) Interface LED/Buzzer with Arduino Uno and writea program to turn ON LED for 1 sec after every 2 seconds. b) Interface Buzzer with Arduino Uno and write a program to turn ON sound by Buzzer for 2 seconds.	Arduino Uno (1), LED(2), and Buzzer (1)
3.	Inputting Digital Signal: a) Interface push button and LED with Arduino Uno and write a program to turn ON LED when push button is pressed. b) Interface digital sensor (IR-infrared sensor) with Arduino Uno and write a program to turn ON Sound by Buzzer when object detects.	Arduino Uno (1), Pushbuttons(2), LED (2), Buzzer (1), and IR sensor module (1)

4.	Inputting Analog Signal: a) Interface Potentiometer with Arduino Uno and write a program to increase and decrease light intensity of LED. b) Interface LDR light sensor with Arduino and writea program to control LED.	Arduino Uno (1), Potentiometer (1), LED (2), and LDR sensor module (1)	
5.	Reading and Writing Data: Interface 4 x 4 keypad and LCD display with Arduino Uno and write a program to display pressed value on LCD.	Arduino Uno (1), 4 x 4 key pad (1), and LCD display (1)	
6.	NodeMCU: a) Familiarization with NodeMCU hardware, software, and perform necessary software installation. b) Interface RGB LED with NodeMCU and write a program to turn ON/OFF different colors for 2/3 seconds.	NodeMCU hardware,software platforms, and RGB LEDs (1)	
7.	Web Server: Interface motor using relay with NodeMCU and write a program to turn ON/OFF motorwith help of relay when button is pressed from server web page.	NodeMCU (1), dc motor (1), 2 channel relay (1), and motor driver (1)	
8.	Raspberry Pi: Familiarization with single board computer (SBC), Raspberry Pi hardware, software, and perform necessary software installation.	Raspberry Pi hardwareand Python software	
9.	Radio Frequency Identification (RFID): Interface RFID with Raspberry Pi and write a program to print tag information (accept/reject) on OLED display.	Raspberry Pi (1), RFIDreader module (1), RFID tags (3), OLED module(1)	
10.	Short Range Communication: Interface Bluetooth and heart beat rate sensor with Raspberry Pi and write a python program to send beats per minute (BPM) rate to smart phone using Bluetooth.	Raspberry Pi (1), Blutooth module (2), heart beat sensor module (1), and smart phone (1).	
11.	Cloud Communication: a) Interface DHT11 sensor and write a python program on Raspberry Pi to upload temperature and humidity data to thingspeak cloud. b) Interface DHT11 sensor and write a program on Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.	Raspberry Pi (1), temperature and humidity(DHT11) sensor module (1), and library thingspeak cloud	
12.	Machine-to-Machine (M2M) Protocol: a) Write a program on Raspberry Pi to publish temperature and humidity data to MQTT broker. b) Write a program on Raspberry Pi to subscribe to MQTT broker for temperature and humidity dataand print it.	Raspberry Pi (1), temperature and humidity(DHT11) sensor module (1), and library of MQTT	
Add on Experiments			

13.	GSM and GPS: Interface GSM and GPS Module using Arduino/Raspberry Pi and Write a program to send latitude and longitude of my current location through SMS.	Arduino/ Raspberry Piand GSM and GPS Module(1)	
14.	Line of Site Communication: Interface Zigbee communication module with Arduino/ Raspberry Pi and write a program to	Arduino/ Raspberry Pi (1) and Zigbee communication	

Text Books :	Vijay Madisetti, Arshdeep Bahga," Internet of Things A Hands-On-Approach", 1stedition, Orient Blackswan Private Limited,2014.
References :	1. Adrian McEwen, "Designing the Internet of Things", 1st edition, Wiley Publishers, 2013. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things",1st edition, DND Ventures LLC, 2013.

BIG DATA ANALYTICS LAB

Department Elective - IV Lab

IV B.Tech – VII Semester (Code: 20CSD43)

Practicals :	3 Periods / Week	Continuous Internal Assessment :	50
Final Exam :	3 hours	Semester End Exam :	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the concepts of Data mining and Big Data Analytics
- Apply machine learning algorithms for data analytics
- Analyze various text categorization algorithms
- Use Technology and tools to solve the Big Data Analytics problems

Course Outcomes: At the end of the course students will be able to

CO1	Understand the concepts of Data mining and Big Data Analytics
CO2	Apply machine learning algorithms for data analytics
CO3	Analyze various text categorization algorithms
CO4	Use Technology and tools to solve the Big Data Analytics problems

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3
CO2	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3
CO3	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3
CO4	3	3	3	3	3	-	-	2	-	2	-	3	3	3	3

LIST OF EXPERIMENTS

1. Write the steps for installation of Hadoop.
2. Write commands to interact with HDFS interface.
3. Write a Map Reduce program for Word Count Example.
4. Write a Map Reduce program for Card Count data set.
5. Write the steps for installation of Pig.
6. Write the word count script using Pig Latin.
7. Illustrate the basic Pig Latin concepts with help of any dataset.
8. Write the steps for installing Hive.
9. Illustrate the creation, loading & complete select statements in Hive.
10. Write the script how data will be transfer using Sqoop.

Text Book(s):

1. HADOOP "The Definitive Guide", Tom White, O'Reilly Publications, 4th Edition.

PROJECT-1
IV B.Tech – VII Semester (Code: 18CSP01)

Practicals :	--	Continuous Internal Assessment :	50
Final Exam :	--	Semester End Exam :	50

Pre-Requisite: None.

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

CO1	Identify the real time problem related to domain knowledge and outline a solution for the problem.
CO2	Acquire practical knowledge related to preparation of project.
CO3	Report the outcomes of the project by means of verbal and written presentation

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	3	3	3	3	3	3	-	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	-	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	-	3	3	3	3

The Project work shall be carried out by a batch consisting not more than four students for one semester. It should help the students to comprehend and apply different theories and technologies that they have learnt through and are learning. It should lead to a substantial result as a comparative study, a new application of the technologies available or some extension to the works carried out by some researcher and published in referred journals. Each batch must carry out the analysis, design, implementation and testing of the entire project basing on the Software Engineering principles. There shall be a total of four reviews made by the batch regarding:

1. 0^{th} Review : The idea/concept which forms the basis for their project shall be presented to the guide, concerned in charge and classmates and shall get the approval for Continuation.
2. 1^{st} Review : The analysis and design carried out.
3. 2^{nd} Review : The implementation and the testing done.
4. 3^{rd} Review : Over all Presentation of the work carried out and the results found out for the valuation under the internalAssessment.

A comprehensive report on the lines of IEEE Format is to be submitted at theend of the semester, which is certified by the concerned guide and the HOD.
There shall be an external guide appointed by the Principal/Controller of Examinerto make an assessment and to carry out the Viva-Voce examination.

INTERNSHIP IV B.Tech – VII Semester (Code: 18CSII1)			
Practicals :	--	Continuous Internal Assessment :	--
Final Exam :	--	Semester End Exam :	100

Pre-Requisite: None.

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

CO1	Improve Communication skills
CO2	Improve Soft Skills
CO3	Develop report writing skills
CO4	Analyze the information, concepts, and ideas

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	-	-	-	-	3	3	-	3	3	3	3
CO2	-	-	-	-	-	-	-	-	3	3	-	3	3	3	3
CO3	-	-	-	-	-	-	-	-	3	3	-	3	3	3	3
CO4	-	-	-	-	-	-	-	-	3	3	-	3	3	3	3

INDUSTRIAL MANAGEMENT & ENTREPRENEURSHIP DEVELOPMENT
IV B.Tech – VIII Semester (Code:18ME005)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- To provide students an insight into the concepts of general, scientific management and various forms of business organizations along with awareness about various organization structures
- It aims to provide the students with an understanding of basics of human resource management, marketing management.
- To make the students to understand inventory control concepts, fundamentals of TQM, and supply chain management.
- To provide an understanding of financial management and realize the importance of Entrepreneurship.

Course Outcomes: At the end of the course students will be able to

CO1	Describe the various functions of the management. Learn various forms and structures of business organizations.
CO2	Understand how resources to be planned and also understand various motivation theories, leadership styles and marketing management.
CO3	Develop knowledge about inventory control. Gain the knowledge on Total quality management and understand supply chain management.
CO4	Grasp complete knowledge on importance of entrepreneurship and ability to understand capital and various types of capital.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	-	-	-	-	-	-	-	-	-	3	3	2	-	-
CO2	-	-	-	-	-	-	-	-	-	-	3	3	2	-	-
CO3	-	-	-	-	-	-	-	-	-	-	3	3	2	-	-
CO4	2	3	2	3	-	-	-	-	-	-	3	3	2	-	-

UNIT-I 15 Periods

General management: Management definition, Functions of Management and Principles of Management.
Forms of Business Organization: Salient features of Sole Proprietorship, Partnership, Joint Stock Company, Private Limited and Public Limited companies; Merits and Demeritsof above types
Marketing Management: Functions of Marketing, Concepts of Selling and Marketing, Marketing mix (4 Ps); Advertising and sales promotion; Product life cycle.

UNIT-II	15 Periods
Production Management: Types of production systems, Productivity vs. Production, Production planning and control. Materials Management: Inventory Control, Basic EOQ model, ABC analysis. Quality Control: Control Charts: chart, R chart, P chart, C chart, Acceptance sampling.	
UNIT-III	15 Periods
Financial Management: Functions of finance, Types of Capital-Fixed and WorkingCapital, Break Even Analysis. Depreciation: Straight line method of depreciation, declining balance method and the Sum of Years digits method of Depreciation. Personnel Management: Functions of personnel management, human resource planning, recruitment, selection, placement, training and development and performance appraisal. Motivation theories, leadership styles	
UNIT-IV	15 Periods
Entrepreneurship Development: Introduction, Entrepreneurial characteristics, Functions of an Entrepreneur; Factors affecting entrepreneurship; Role of communication in entrepreneurship; Entrepreneurial Development-Objectives, Need of Training for enterprises; Finance for the enterprises; Product, Process and Plant Design- Product analysis and Product Design process. Steps in process design and Plant Design.	
Text Book(s):	1. Industrial Engineering and Operations Management, S.K.Sharma,Savita Sharma and Tushar Sharma. 2. Industrial Engineering and Production Management, Mahajan. 3. Management Science, A.R.Aryasri
References :	1. Operations Management, Joseph G Monks. 2. Marketing Management, Philip Kotler. 3. The Essence of Small Business, Barrow colin.

INSTITUTIONAL ELECTIVE - II (Common for all branches) IV B.Tech – VIII Semester (Code: 18__I__)			
Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks
List of the Subjects			
18CEI03	Disaster Management		
18CEI04	Remote sensing & GIS		
18CSI03	Python Programming		
18CSI04	Computer Networks		
18ECI03	Wireless Communications		
18ECI04	Artificial Neural Networks		
18EEI03	High Voltage Engineering		
18EEI04	Electrical Energy Conservation and Auditing		
18EII03	Robotics and Automation		
18EII04	Sensors And Signal Conditioning		
18ITI03	Mobile Application Developments		
18ITI04	Web Technologies		
18MEI03	Non-Conventional Energy Sources		
18MEI04	Automobile Engineering		
18MAI02	Graph Theory		
18PHI03	Advanced Materials		
18PHI04	Opto Electronic Devices And Applications		
18ELI03	Professional Communication		
More Details Please refer Annexure 2			

PROTOCOLS FOR SECURE ELECTRONIC COMMERCE

Department Elective - V

IV B.Tech – VIII Semester (Code: 18CSD51)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- To Comprehend and apply electronic money and payment systems.
- To Plan the architecture for the electronic payments and provide security for the payments.
- To Recognize the concept of security socket layer and the protocols.
- To Comprehend and plan micro payments and support face to face commerce.

Course Outcomes: At the end of the course students will be able to

CO1	Analyse the impact of E-Commerce on business models and strategy.To develop E-marketing strategies and digital payment.
CO2	Elaborate the concepts of SSL, TSL and established protocols.
CO3	Create and carryout secure payments with magnetic strip and integrated circuit cards.
CO4	Develop the framr work and anatomy of money and payment systems.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	3	-	-	3	-	-	2	-	-	-	2	2	2	2
CO2	3	3	2	-	3	-	-	2	-	-	-	2	2	3	3
CO3	3	3	2	-	3	-	-	2	-	-	-	2	3	3	3
CO4	3	3	2	-	3	-	-	2	-	-	1	2	3	3	3

UNIT-I — 15 Periods

Overview of Electronic Commerce: Electronic Commerce and Mobile Commerce, Effects of the Internet and Mobile Networks, Network Access, Barcodes, Smart Cards, Parties in Electronic Commerce, Security.

Money and Payment Systems: Mechanisms of Classical Money, Payment Instruments, Types of Dematerialized Monies, Purses, Holders, and Wallets, Transactional Properties of Dematerialized Currencies, Overall Comparison of the Means of Payment, Practice of Dematerialized Money, Clearance and Settlement in Payment Systems, Drivers of Innovation in Banking and Payment Systems.

UNIT-II — 15 Periods

Transport Layer Security and Secure Sockets Layer: Architecture of SSL/TLS,SSL/TLS Security Services, SSL/TLS Subprotocols, Performance of SSL/TLS, Implementation Pitfalls.

The SET Protocol: SET Architecture, Security Services of SET, Certification, Purchasing Transaction, Optional Procedures, Efforts to Promote SETs, SET versus TLS/SSL.

UNIT-III — 15 Periods

Payments with Magnetic Stripe Cards: Point-of-Sale Transactions, Communication Standards for Card Transactions, Security of Point-of-Sale Transactions, Internet Transactions, 3-D Secure, Migration to EMV. Secure Payments with Integrated Circuit Cards: Description of Integrated Circuit Cards, Integration of Smart Cards with Computer Systems, Standards for Integrated Circuit Cards, Multi Application Smart Cards, Security of Integrated Circuit Cards, Payment Applications of Integrated Circuit Cards, EMV Card, General Consideration on the Security of Smart Cards.	
UNIT-IV	15 Periods
Mobile Payments: Reference Model for Mobile Commerce, Secure Element in Mobile Phones, Barcodes, Bluetooth, Near-Field Communication, Text Messages, Bank-Centric Offers, Mobile Operator–Centric Offers, Third-Party Service Offers, Collaborative Offers, Payments from Mobile Terminals. Micropayments: Characteristics of Micropayment Systems, Standardization Efforts, Electronic Purses, Online Micropayments. PayPal.: Evolution of PayPal, Evolution of PayPal, Business Accounts. Digital Money: Privacy with Cash and Digital Money, DigiCash (eCash), Anonymity and Untraceability in DigiCash, Splitting of Value, Detection of Counterfeit (Multiple Spending), Evaluation of DigiCash.	
Text Book(s):	1. Protocols for Secure Electronic Commerce by Mostafa Hashem Sherif, CRC Press (2016).
References :	1. Secure Electronic Commerce by Ford & Baum, Pearson EducationIndia. 2. Secure E-Commerce Systems by P. S. Lokhande and B B Meshram, Amazon Asia-Pacific Holdings Private Limited.

ARTIFICIAL NEURAL NETWORKS AND DEEP LEARNING

Department Elective - V

IV B.Tech – VIII Semester (Code: 18CSD52)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Design an ANN model for identifying complex decision boundaries
- Design a CNN model for Computer Vision applications.
- Apply sequence models to natural language processing tasks.
- Model the structure in the existing data to generate new data samples.

Course Outcomes: At the end of the course students will be able to

CO1	Analyze the key computations underlying deep learning and use them to build and train deep neural networks for various tasks.
CO2	Build, train and test customized object detection systems using Deep CNN-based techniques. Apply CNN and its variants for suitable applications.
CO3	Create Generative Adversarial Networks using the Tensor flow library, train it on the MNIST dataset and generate new images of handwritten digits and to create a vector representation with a much lower dimensional space using Word Embedding's.
CO4	Design recurrent neural networks with attention mechanisms for speech recognition, natural language classification, generation, translation.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	3	-	-	-	-	-	-	2	3	3	3
CO2	3	3	3	3	3	-	-	-	-	-	-	2	3	3	3
CO3	3	3	3	3	3	-	-	-	-	-	-	2	3	3	3
CO4	3	3	3	3	3	-	-	-	-	-	-	2	3	3	3

UNIT-I — 15 Periods

Multi-layer perceptron – Training, Activation functions, Recognizing handwritten digits, One-hot encoding (OHE), Defining a simple neural network in TensorFlow, Running a simple TensorFlow, Improving the simple net, Dropout, Optimizers, Epochs, Optimizer learning rate, Increasing the number of internal hidden neurons, Regularization, Sentiment analysis, Hyper parameter tuning.

UNIT-II — 15 Periods

Convolutional Neural Networks - Deep Convolutional Neural Network (DCNN), local receptive fields, shared weights and bias, A mathematical example, Convnets in TensorFlow, pooling layers, max pooling, average pooling. LeNet and CIFAR-10, classification with VGG16 Net.

UNIT-III — 15 Periods

Generative Adversarial Networks - What is a GAN, MNIST using GAN in TensorFlow, Deep convolutional GAN (DCGAN), and DCGAN for MNIST digits.

Word embeddings – Origins and fundamentals, Distributed representations, Static embeddings, Word2Vec, GloVe, Creating your own embedding using genism, Exploring the embedding space with genism, Using word embeddings for spam detection.

UNIT-IV — 15 Periods

Recurrent Neural Networks - The basic RNN cell, back propagation through time (BPTT), vanishing and exploding gradients, RNN cell variants, Long short-term memory (LSTM), Gated recurrent unit (GRU), peephole LSTM, RNN variants, Bidirectional RNNs,stateful RNNs, RNN topologies- One-to-Many, Many-to-One, Many-to-Many – POS tagging, Encoder-Decoder architecture – seq2seq	
Text Book(s) :	1. Deep Learning with TensorFlow 2 and Keras, Antonio Gulli, Amita Kapoor, Sujit Pal, second edition, Packt publishers.
References :	1. Deep Learning by Ian Goodfellow, Yoshua Bengio, Aaron Courville, MIT Press. 2. Deep Learning: Methods and Applications by Li Deng, Dong Yu, Now Publishers. 3. Neural Networks and Deep Learning by Michael Nielsen,Determination Press.

NATURAL LANGUAGE PROCESSING

Department Elective - V

IV B.Tech – VIII Semester (Code:18CSD53)

Lectures :	4 Periods / Week	Continuous Internal Assessment :	50 Marks
Final Exam :	3 hours	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Objectives: Students will be able to

- Get familiarized with the concepts and techniques of Natural language Processing for analyzing words based on Morphology and CORPUS.
- Make them understand the concepts of morphology, syntax, semantics and pragmatics of the language and that they are able to give the appropriate examples that will illustrate the above mentioned concepts.
- Recognize the significance of pragmatics for natural language understanding.
- Be capable to describe the application based on natural language processing and to show the points of syntactic, semantic and pragmatic processing.

Course Outcomes: At the end of the course students will be able to

CO1	Know the basics of NLP techniques and how to model languages using their grammars.
CO2	Gain a thorough understanding of NLP at the structural and word levels.
CO3	Comprehend the nuances of language at the conversational and semantic levels.
CO4	Gain Knowledge on Natural Language generators and Machine Translation Techniques

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	-	2	2	3	3	-	-	-	-	-	-	2	2	3	3
CO2	-	2	2	3	3	-	-	-	-	-	-	2	3	3	3
CO3	-	2	2	3	3	-	-	-	-	-	-	2	3	3	3
CO4	-	2	2	3	3	-	-	-	-	-	-	2	3	3	3

UNIT-I — 15 Periods

Introduction: - Understanding natural language processing, Understanding basic applications, Advantages of togetherness-NLP and Python, Environment setup for NLTK. Practical Understanding of a Corpus and Database: - What is a corpus? Why do we need a corpus? Understanding corpus analysis, Understanding types of data attributes, Exploring different file formats for corpora, Resources for accessing free corpora, Preparing a dataset for NLP applications, Web scraping.

UNIT-II — 15 Periods

Understanding the Structure of a Sentence: - Understanding components of NLP, Natural language understanding, Defining context-free grammar, Morphological analysis,Syntactic analysis, Discourse integration, Pragmatic analysis.

UNIT-III — 15 Periods

Preprocessing: - Handling corpus-raw, Handling corpus-raw sentences, Basic preprocessing, Practical and customized preprocessing.

UNIT-IV — 15 Periods

Feature Engineering and NLP Algorithms:- Understanding feature engineering, Basic feature of NLP, Basic statistical feature of NLP, Advantages of features engineering, Challenges of features engineering.

Text Book(s):	1. Python Natural Language Processing (Packt Publishers) Author: Jalaj Thanaki
References :	1. Natural Language Processing (Oxford Publishers) Author: Tanvir Siddiqui

PROJECT - II IV B.Tech – VIII Semester (Code: 18CSP02)			
Practicals :	--	Continuous Internal Assessment :	50 Marks
Final Exam :	--	Semester End Exam :	50 Marks

Pre-Requisite: None.

Course Outcomes: At the end of the course students will be able to

CO1	Apply the domain knowledge to provide solution for the real time problems. Acquire the tools & techniques of project implementation and to get an exposure to handle projects.
CO2	Prepare the plan to handle project. Apply advanced software tools to analyze the project execution.
CO3	Improve the presentation and documentation writing skills. Apply an insight into modern technologies, tools to get the results for the real-world problems.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	3	3	3	3	3	3	-	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	-	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	-	3	3	3	3

The Project work shall be carried out by a batch consisting not more than four students for one semester. It should help the students to comprehend and apply different theories and technologies that they have learnt through and are learning. It should lead to a substantial result as a comparative study, a new application of the technologies available or some extension to the works carried out by some researcher and published in referred journals. Each batch must carry out the analysis, design, implementation and testing of the entire project basing on the Software Engineering principles. There shall be a total of four reviews made by the batch regarding:

5. 0^{th} Review : The idea/concept which forms the basis for their project shall be presented to the guide, concerned in charge and classmates and shall get the approval for Continuation.
6. 1^{st} Review : The analysis and design carried out.
7. 2^{nd} Review : The implementation and the testing done.
8. 3^{rd} Review : Over all Presentation of the work carried out and the results found out for the valuation under the internalAssessment.

A comprehensive report on the lines of IEEE Format is to be submitted at theend of the semester, which is certified by the concerned guide and the HOD.
There shall be an external guide appointed by the Principal/Controller of Examinerto make an assessment and to carry out the Viva-Voce examination.

Annexure – 1
Institution Elective - I

BAPATLA ENGINEERING
COLLEGE::BAPATLA
(Autonomous)
SCHEME OF INSTRUCTION & EXAMINATION (Semester System)
For
Computer Science and Engineering

List of Institutional Electives

Institutional Elective-I	
18CEI01	Air Pollution & Control
18CEI02	Rural Water Supply And Environment Sanitation
18CSI01	Java Programming
18CSI02	Database Management System
18ECI01	Digital Image Processing
18ECI02	Embedded Systems
18EEI01	Application of Wavelets to Engineering Problems
18EEI02	Industrial Electrical Systems
18EII01	Principles & Applications of MEMS
18EII02	Power Plant Instrumentation
18ITI01	Introduction to Data Analytics
18ITI02	Cyber Security
18MEI01	Fluid Power and Control Systems
18MEI02	Project Management
18MAI01	Linear Algebra
18PHI01	Nano-Materials and Technology
18PHI02	Fiber Optics Communications

AIR POLLUTION & CONTROL

Institutional Elective-I (Code: 18CEI01)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- To take up the basic concepts of sources and effects of Air Pollution
- The contents involved the knowledge of the effect of metrological parameters on air pollution.
- The contents involved the knowledge of the control of air pollution from particulates.
- To develop skills relevant to control of gaseous pollution and also introduce about Air QualityManagement.

Course Outcomes: Students will be able to

CO-1	The concepts of sources of air pollution and effects of air pollutants on man, materials and plants
CO-2	Be able to understand the effect of air pollution with meteorological parameters
CO-3	The knowledge about particulate control by different devices
CO-4	Be able to develop gaseous pollution control technologies and estimate the quality monitoring of air pollutants

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	2	3		1		3	3	1					3	3	1
CO-2	3	2	3	1	2	1	2						2	2	1
CO-3	3	3	3	2	2	1	3					1	2	3	2
CO-4	2	3	3	3	2	1	3	1				1	2	3	2

UNIT-1 15 Periods

Air Pollution –Definitions, Air Pollutants–Classifications –Natural and Artificial– Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution-stationary and mobile sources.

Effects of Air pollutants on man, material land vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains and Ozone Holes etc.

UNIT-2 15 Periods

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomenon Air Quality-wind rose diagrams.

UNIT-3 15 Periods

Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Theory and problem related to Gaussian dispersion model.

Control of particulates –Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's–Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT-4 15 Periods

General Methods of Control of NOx and Sox emissions–In-plant Control Measures, process changes, dry and wet methods of removal and recycling. Air Quality Management–Monitoring of SPM, SO; NO and CO Emission Standards.	
Text Books :	1. Airpollution By M.N.Raoand H.V.N.Rao –Tata Mc.Graw Hill Company. 2. Airpollution by Wark and Warner. –Harper & Row, NewYork.
References :	1. An introduction to Air pollution by R.K.Trivedy and P.K.Goel, B.S.Publications

RURAL WATER SUPPLY AND ENVIRONMENT SANITATION

Institutional Elective-I (Code: 18CEI02)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Apply knowledge of basic sciences and engineering to analyze water resources systems forsocio-economic development
- Identify the sources of water and their characteristics
- Identify and select criteria for the selection of sanitation technology
- To learn about analytical & design methods for environmental systems

Course Outcomes: Students will be able to

CO-1	Identify problems pertaining to rural water supply and sanitation
CO-2	Design water supply and sanitation system for rural community
CO-3	Design low-cost waste management systems for rural areas
CO-4	Plan and design an effluent disposal mechanism

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	1		2			1	2	2		2		2	1	2	2
CO-2	3	2	2			2		2	2	2		2	2	2	1
CO-3	2	2	2			2	2	2	2	2		2	2	2	1
CO-4	2		1			2		2				2	2	2	

UNIT-1 15 Periods

WATER SUPPLY: Issues of rural water supply –Various techniques for rural water supply- merits- National rural drinking water program- rural water quality monitoring and surveillance- operation and maintenance of rural water supplies

UNIT-2 15 Periods

LOW-COST WATER TREATMENT: Introduction – Epidemiological aspects of water quality methods for low cost water treatment - Specific contaminant removal systems

UNIT-3 15 Periods

RURAL SANITATION: Introduction to rural sanitation- Community and sanitary latrines - Planning of wastewater collection system in rural areas- Treatment and Disposal of wastewater - Compact and simple wastewater treatment units and systems in rural areas stabilization ponds - septic tanks - Imhoff tank- soak pits- low-cost excreta disposal systems Effluent disposal.

UNIT-4 15 Periods

INDUSTRIAL HYGIENE AND SANITATION: Occupational Hazards- Schools- Public Buildings- Hospitals- Eating establishments- Swimming pools – Cleanliness and maintenance and comfort- Industrial plant sanitation. SOLID WASTE MANAGEMENT: Disposal of Solid Wastes- Composting- land filling incineration- Biogas plants - Rural health - Other specific issues and problems encountered in rural sanitation.

Text Books :	1. Eulers, V.M., and Steel, E.W., Municipal and Rural Sanitation, 6th Ed., McGraw Hill BookCompany, 1965. 2. Park, J.E., and Park, K., Text Book of Preventive and Social Medicine, Banarsidas Bhanot, 1972
References :	

JAVA PROGRAMMING

Institutional Elective-I (Code: 18CSI01)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the concepts of Data Types, Variables, Arrays, Operators, control Statements,Classes and Objects
- Understand Inheritance, Interfaces, Packages and Strings.
- Understand and write programs on Exception Handling and I/O.
- Understand the concepts of Event Handling, Applets and Swings.

Course Outcomes: Students will be able to

CO-1	Understand basic Java language syntax and semantics to write Java programs, use conceptssuch as variables, conditional and iterative execution methods etc. And use the Java SDK environment to create, debug and run Java programs
CO-2	Identify classes, objects, members of a class and relationships among them needed for a specific problem and Write Java application programs using OOP principles and properprogram structuring
CO-3	Demonstrate the concepts of polymorphism, inheritance, packages and interfaces.
CO-4	Write Java programs to implement error handling techniques using exception handling

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3	2	3	-	-	-	-	-	-	-	-	-	3	3	2
CO-2	3	2	3	-	-	-	-	-	-	-	-	-	3	3	2
CO-3	3	2	3	-	-	-	-	-	-	-	-	-	3	3	2
CO-4	3	2	3	-	2	-	-	-	-	-	-	-	3	3	2

UNIT-1 — 15 Periods

The History and Evolution of Java, An Overview of Java, Data Types, Variables and Arrays, Operators,Control Statements, Introducing Classes A Closer Look at Methods and Classes.

UNIT-2 — 15 Periods

Inheritance, Packages and Interfaces.

Strings: String Constructors, Program using 10 String methods, String Buffer class, Program using 10 String Buffer methods Introducing String Builder class.

UNIT-3 — 15 Periods

Exception Handling

I/O: I/O Basics, Reading Console Input, Writing Console Output, The Print Writer class, Reading and Writing Files, Automatically Closing a File.

UNIT-4 — 15 Periods

The Applet Class: Applet Architecture, An Applet Skeleton, Applet program to draw shapes, setting Color, Font using Graphicsclass

Event Handling, GUI Programming with Swing: The Origins of Swing, Advantages of Swing over AWT, The MVC Connection, Program using Swing Components JLabel, JText Field, JText Area, JCheck box, JButton, JTabbed Pane, JTable, JTree, JCombo Box.	
Text Books :	1. Java The Complete Reference‖, 9th Edition, Herbert Schildt, TMH Publishing Company Ltd.
References :	1. Java: A Beginner's Guide, Eighth Edition, Herbert Schildt, TMH Publishing Company Ltd. 2. Head First Java, Second Edition, O′Reilly

DATABASE MANAGEMENT SYSTEM

Institutional Elective-I (Code: 18CSI02)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Familiarize with fundamental concepts of database and various database architectures and Design relations for Relational databases using conceptual data modeling. Familiarize the student with the basic taxonomyand terminology of the computer networking area.
- Implement formal relational operations in relational algebra and SQL
- Identify the Indexing types and normalization process for relational database.
- Use mechanisms for the development of multi user database applications.

Course Outcomes: Students will be able to

CO-1	Ability to apply knowledge of database design methodology which give a good formal foundation in relational data model and Understand and apply the principles of data modeling using ER Model.
CO-2	Familiar with relational DB theory and will able to write relational algebra expressions, Relational Calculusand SQL.
CO-3	Design database schema and Identify and solve the redundancy problem in database tables usingnormalization.
CO-4	Understand transaction processing and concurrency control techniques.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1		3	2	2		2				3			2		3
CO-2	3	3	2	2						3			3	3	3
CO-3	3	3	3	3						3			3	3	3
CO-4		3	3	3		3				3			2	3	3

UNIT-1 — 16 Periods

Databases and Database Users: Introduction - An Example - Characteristics of the Database Approach–Actors on the Scene- Workers behind the Scene-Advantages of Using the DBMS Approach.

Database System Concepts and Architecture: Data Models, Schemas, and Instances- Three-Schema Architecture and Data Independence- Database Languages and Interfaces- The Database System Environment -Centralized and Client/Server Architectures for DBMSs.

Data Modeling Using the Entity-Relationship(ER)Model: Using High-Level Conceptual Data Models for Database Design-An Example Database Application-Entity Types, Entity Sets, Attributes, and Keys-Relationship Types, Relationship Sets, Roles, and Structural Constraints-Weak Entity Types-Refining the ER Design for the COMPANY Database-ER Diagrams, Naming Conventions, and Design Issues

UNIT-2 — 16 Periods

The Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT - Relational Algebra Operations from Set Theory-Binary Relational Operations: JOIN and DIVISION–Additional Relational Operations-The Tuple Relational Calculus-The Domain Relational Calculus

Schema Definition, Constraints, Queries, and Views: SQL Data Definition and Data Types – Specifying Constraints in SQL-Schema Change Statements in SQL-Basic Queries in SQL– More Complex SQL Queries-INSERT, DELETE, and UPDATE Statements in SQL- Views (Virtual Tables) in SQL

UNIT-3	14 Periods

Introduction to Schema Refinement: Problems Caused by Redundancy, Decompositions– ProblemRelated 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 Database Design – Multivalued Dependencies FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

UNIT-4	15 Periods

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing- Transaction and System Concepts-Desirable Properties of Transactions-Characterizing Schedules Based on Recoverability –Characterizing Schedules Based on Serializability

Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control –Concurrency Control Based on Time stamp Ordering– Multi version Concurrency Control Techniques-Validation(Optimistic) Concurrency Control Techniques-Granularity of Data Items and Multiple GranularityLocking

Text Books :	Fundamentals of Database Systems, Ramez Elmasri and Navathe Pearson Education, 6thedition
References :	1. Introduction to Database Systems, C.J. Date Pearson Education 2. Database Management Systems, Raghu Rama krishnan, Johannes Gehrke, TATA McGraw Hill3rdEdition 3. Database System Concepts, Silberschatz, Korth, McGraw hill,5thedition

Digital Image Processing

Institutional Elective-I (Code: 18ECI01)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Recall and summarize the digital image fundamentals and to be exposed to basic image processingtechniques.
- Be familiar with image restoration, segmentation and compression techniques.
- Illustrate the representation of monochrome and color images in the form of features and descriptors.
- Give the students a taste of the applications of the theories taught in the subject This will be achievedthrough the project and some selected lab sessions. Develop a theoretical foundation of fundamental Digital Image Processing concepts.

Course Outcomes: Students will be able to

CO-1	Explain the digital image fundamentals and basic image processing techniques
CO-2	Apply appropriate technique for image enhancement both in spatial and frequency domains
CO-3	Analyze the need for image restoration and color image processing and illustrate various restoration and color image processing techniques.
CO-4	Evaluate various segmentation, representation and description techniques on digital images

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	2	2	2	2	2	-	-	-	-	-	-	-	2	1	2
CO-2	3	2	3	1	2	-	-	-	-	-	-	-	2	1	2
CO-3	3	2	3	3	2	-	-	-	-	-	-	-	2	2	2
CO-4	2	2	1	2	2	-	-	-	-	-	-	-	2	2	2

UNIT-1 15 Periods

INTRODUCTION: What Is Digital Image Processing? The Origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.

DIGITAL IMAGE FUNDAMENTALS: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels.

UNIT-2 15 Periods

SPATIAL AND FREQUENCY DOMAIN FILTERING: Background. Some Basic Intensity Transformation functions, Histogram Processing, Fundamentals of Spatial Filters, Smoothing Spatial Filters, Sharpening Spatial Filter. The basics of filtering in the Frequency Domain, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters.

IMAGE COMPRESSION: Fundamentals – Image Compression models – Error Free Compression, Lossy Compression

UNIT-3 15 Periods

IMAGE RESTORATION: A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only-Spatial Filtering, Periodic Noise Reduction

by Frequency Domain Filtering, Linear, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering. **COLOR IMAGE PROCESSING:** Color Fundamentals, Color Models, Pseudo color Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Image Segmentation based on Color.	
UNIT-4	15 Periods
IMAGE SEGMENTATION: Detection of discontinuities, Thresholding, Edge based Segmentation andRegion based Segmentation **IMAGE REPRESENTATION AND DESCRIPTION**: Representation schemes, Boundary Descriptors,Regional Descriptors.	
Text Books :	1. R. C. Gonzalez, R. E. Woods, Digital Image Processing 4th Edition, Pearson Education Publishers,2019.
References :	1. S Jayaraman, S Esakkirajan, T Veerakumar, Digital Image Processing, Mc-Grah Hill Publications,2010. 2. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing Analysis and Machine Vision,Thomson learning, Second Edition, 2001. 3. S.Sridhar, Digital Image Processing, Oxford University Press, 2016.

EMBEDDED SYSTEMS

Institutional Elective-I (Code: 18ECI02)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand characteristics, design metrics, technologies in embedded system design.
- Know computation models in embedded system design and the details of various serial communication interfaces
- Understand Embedded/RTOS concepts
- Learn the overview of Embedded/RTOS and general techniques in design technologies

Course Outcomes: Students will be able to

CO-1	Describe hardware/software tradeoffs in the design of an embedded system.
CO-2	Discuss computation models in embedded system design and the details of various serial communication interfaces
CO-3	Demonstrate the architecture of kernel and various kernel objects
CO-4	Explain overview of Embedded/RTOS and general techniques in design technologies to improve productivity

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	2	3			2								2	2	
CO-2	2	3			2								2	2	
CO-3	2	3											2	2	
CO-4	2	3	3		2								2	2	

UNIT-1 — 15 Periods

Introduction to embedded systems: Design challenges, processor technology, IC technology, design technology, tradeoffs, single purpose processor, RT level combinational logic, sequential logic (RT level) custom single purpose processor design, General purpose processors: basic architecture, pipelining, programmers view, development environment, ASIPS, microcontrollers and digital signal processors.

UNIT-2 — 15 Periods

STATE MACHINE AND CONCURRENT PROCESS MODELS: models vs. languages, FSMD, using state machines, PSMM, concurrent process model, concurrent processes, communication and synchronization among processes, data flow model and real-time systems. Need for communication interfaces, RS232/UART, RS422/RS485, USB, Infrared, IEEE 802.11, and Bluetooth.

UNIT-3 — 15 Periods

EMBEDDED SYSTEM AND RTOS CONCEPTS: Architecture of kernel, tasks and task scheduler, interrupt service routines, semaphores, mutex. Mail boxes, message queues, event registers, pipes and signals.

UNIT-4 — 15 Periods

EMBEDDEDSYSTEM AND RTOS CONCEPTS: Timers, memory management, priority

inversion problem, embedded OS and real-time OS, RTLinux, and Handheld OS. Design technology: Introduction, automation, synthesis, parallel evolution of compilation and synthesis, logic synthesis, RT synthesis, behavioral synthesis, system synthesis, HW/SW co-design, verification, and co-simulation.	
Text Books :	1. Frank Vahid, Tony D Givargis, Embedded system design – A unified HW/ SW Introduction, JohnWiley & sons 2002. 2. KVKK Prasad, Embedded and real-time systems, DreemtechPress, 2005.
References :	1. Raj Kamal, Embedded system architecture, programming and design, TMH edition. 2. Mohammad Ali Mazidi, Janice G., The 8051 microcontroller and embedded systems, Pearson edition. 3. Jonathan W Valvano, Embedded Microcomputer Systems, Brooks/cole, Thompson

APPLICATIONS OF WAVELETS TO ENGINEERING PROBLEMS

Institutional Elective-I (Code: 18EEI01)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the fundamental of signal decomposition using Fourier transform, Short Time Fourier Transform and Wavelet Transform.
- Analyze the signals using discrete wavelet transform.
- Understand the concept of multi-resolution analysis.
- Explain the wavelet reconstruction and applications of wavelet.

Course Outcomes: Students will be able to

CO-1	Explain the signal decomposition using Fourier transform, Short Time Fourier Transform and Wavelet Transform.
CO-2	Analyze the signals using discrete wavelet transform.
CO-3	Apply multiresolution analysis to the signals for decomposition.
CO-4	Explain the wavelet reconstruction and applications of wavelet.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3	2	2	-	2	-	-	-	-	-	-	-	3	-	-
CO-2	3	2	2	-	2	-	-	-	-	-	-	-	3	-	-
CO-3	3	2	2	-	2	-	-	-	-	-	-	-	3	-	-
CO-4	3	3	3	2	3	-	-	-	-	-	-	-	3	-	-

UNIT-1 — 15 Periods

Fundamentals of signal decomposition: Stationary and non-stationary signals. brief overview of Fourier transforms, Short-time Fourier transform (STFT). Introduction to wavelets, continuous wavelet transform - definition - scaling – shifting - scale and frequency. CWT as a correlation, time frequency resolution.

UNIT-2 — 15 Periods

Discrete Wavelet Transform: Introduction to the DWT and orthogonal wavelet decomposition. One Stage filtering, Approximation and Details, Filter bank analysis. Multi resolution analysis. orthogonal wavelet decomposition based on the Haar wavelet – digital filter implementation of the Haar wavelet decomposition (Mallat's algorithm).

UNIT-3 — 15 Periods

Multi Resolution Analysis: Construction of a general orthonormal MRA, formal definition, implication of the dilation equation and orthogonality. Introductory concepts of biorthogonal wavelet basis and wavelet packet synthesis. Two-dimensional wavelet decomposition, regularity, vanishing moments. Multilevel Decomposition, Number of levels

UNIT-4 — 15 Periods

Wavelet reconstruction: Reconstruction filter, Reconstructing Approximations and details, Multilevel Reconstruction. Signal energy, wavelet-based energy, and power spectra.

Typical Applications: Signal denoising, fault detection and classifications.

Text Books :

1. Rao R.M. & Bopardikar A.S., "Wavelet Transforms-Introduction to Theory

	and Applications", Addison-Wesley, 1998. 2. K P Soman and K. I. Ramachandran, ―Insight into Wavelets from theory to practice, Prentice Hall of India, 2005. 3. Don Hong (Author), Jianzhong Wang (Author), Robert Gardner (Author), Real Analysis with an Introduction to Wavelets and Applications, Academic Press; 1 edition, 2004.
References :	1. James S. Walker, "A Primer on Wavelets and Their Scientific Applications", Chapman and Hall/CRC,2 edition, 2008. 2. C S Burrus, A Gopinath, and Haitao Guo, "Introduction to wavelets and wavelet transforms", Pearson, 1st Edition, 1997. 3. S.V.Narasimhan (Author), Nandini Basumallick (Author), S. Veena (Author), Introduction to Wavelet Transform: A Signal Processing Approach, Alpha Science; 1 edition, 2011.

INDUSTRIAL ELECTRICAL SYSTEMS

Institutional Elective-I (Code: 18EEI02)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.
- Understand various components of industrial electrical systems..
- Analyze and select the proper size of various electrical system components.
- Solve problems involving with different AC and DC sources in electrical circuits.

Course Outcomes: Students will be able to

CO-1	Demonstrate the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.
CO-2	Infer and outline various components of industrial electrical systems.
CO-3	Investigate and analyse the selection the proper size of various electrical system components.
CO-4	Illustrate and solve problems involving with different AC and DC sources in Electrical circuits.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3	3	2										3	2	
CO-2	3	3	2										3	2	
CO-3	3	3	2										3	2	
CO-4	3	3	2										3	2	

UNIT-1 — 15 Periods

Electrical System Components: LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices.

Residential and Commercial Electrical Systems: Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

UNIT-2 — 15 Periods

Illumination Systems: Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting.

UNIT-3	15 Periods
Industrial Electrical Systems I: HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, single line diagram, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.	
UNIT-4	15 Periods
Industrial Electrical Systems II: DG Systems, UPS System, Electrical Systems for the elevators,Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks. **Industrial Electrical System Automation:** Study of basic PLC, Role of in automation, advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation.	
Text Books :	1. H. Joshi, "Residential, "Commercial and Industrial Electrical Systems", McGraw Hill Education, 2007. 2. K. B. Raina, "Electrical Design, Estimating & Costing", New age International, 2017.
References :	1. Surjit Singh, "Electric Estimating and Costing", DhanpatRai and Co., 2016. 2. S. L. Uppal and G. C. Garg, "Electrical Wiring, Estimating &Costing", Khanna publishers,2008. 3. J. B. Gupta, "A Course in Electrical Installation Estimating and Costing", S.K. Kataria&Sons, 2013.

PRINCIPLES AND APPLICATIONS OF MEMS

Institutional Elective-I (Code: 18EII01)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Introduce the reader to the world of MEMS and their fabrication.
- Treatment of actuators and sensing from a generic standpoint and modelling strategies for selected MEMS.
- Acquire the new skills of considering microtechnology based solutions to problems.
- To know how MEMS are modeled.

Course Outcomes: Students will be able to

CO-1	List the advantages and applications of MEMS, list various techniques foradding materials to a substrate
CO-2	List various steps in photolithography and micromachining
CO-3	Define a transducer and list its characteristics, state working principles ofvarious transducers.
CO-4	To model any transducer.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	2	2													
CO-2	1	1													
CO-3	2	2		1											
CO-4	3	3	2	2											

UNIT-1 — 15 Periods

Introduction: What are MEMS? Why MEMS? How MEMS are made? Roadmap and perspective

The substrate and adding materials to it : Introduction, the silicon substrate, additive techniques: oxidation and physical vapour deposition, other additive techniques.

UNIT-2 — 15 Periods

Creating and transferring patterens-photolithography: Introduction, keeping it clean, photoresist, working with resist, masks, resolution, permanent resists.

Creating Structures-Micromachining : Introduction, bulk micromachining processes, surface micromachining, process integration.

UNIT-3 — 15 Periods

Modeling : what is modelling? The input output concept, physical variables andnotation.
MEMS transducers : definition of transducer, distinguishing between sensors and actuators, response characteristics of transducers, MEMS sensors, MEMS actuators, signal conditioning.
Piezoresistive transducers: Introduction, modeling piezoresistive transducers, Piezoresistive pressure sensor.

UNIT-4 — 15 Periods

Capacitive transducers: Introduction, capacitor fundamentals, modelling acapacitive sensor, capacitive accelerometer.
Piezoelectric transducers: Introduction, modelling piezoelectric materials, mechanical

modelling of beams and plates, cantilever piezoelectric actuator. **Thermal transducers**: Introduction, Basic heat transfer, hot-arm actuator.	
Text Books :	Thomas M. Adams, Richard A Layton : Introductory MEMS :Fabrication and applications, Springer publication
References :	Julian W. Gardner, Vijay K Varadan, Osama O. Awadelkarim Microsensors, MEMS, and smart devices, John Wiley and sons.

POWER PLANT INSTRUMENTAITON

Institutional Elective-I (Code: 18EII02)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Compare various types of power plants used to generate electricity by using Renewable and Non- Renewable energy sources.
- Understand the operation of steam generation and its components.
- Understand the operation of various types of boilers and turbines used in power plants.
- Analyze the process control operation involved in power plant instrumentation.

Course Outcomes: Students will be able to

CO-1	Compare various types of power plants used to generate electricity by using Renewable and Non- Renewable energy sources.
CO-2	Understand the operation of steam generation and its components.
CO-3	Understand the operation of various types of boilers and turbines used in power plants.
CO-4	Analyze the process control operation involved in power plant instrumentation.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3		1										2	3	3
CO-2	1		2		1	1							2	2	1
CO-3	1		2		1	1							2	2	1
CO-4	1		2		3	1							2	3	1

UNIT-1 — 15 Periods

AN OVERVIEW OF POWER GENERATION: Brief survey of methods of power generation Hydro, Thermal, Nuclear, Solar wind etc. Importance of instrumentation for power generation – Thermal power plants – Building BlocksDetails of the Boiler process – PI diagram of Boiler. Non electrical parameters, flow of feed water, fuel, air and strain with correction factors for temperature, pressure, temperature level –radiation detectors – smokedensity measurement, dust monitor.

UNIT-2 — 15 Periods

CONTROL LOOPS AND INTERLOCKS IN BOILER: Combustion control – control of Main header pressure, air fuel ratio control, furnace draft and excessiveair control, drum level, main and reheat steam temperature control, burner tiltingup, bypass damper, super heater, spray and gas recirculation controls – B.F.P. recirculation control – hot well and de-aerator level control – Pulverizer control,computers in power plants.

UNIT-3 — 15 Periods

TURBINE MONITORING AND CONTROL: Condenser Vacuum Control –gland steam exhaust pressure control – speed vibration, shell temperature monitoring and control – lubricating oil temperature control – hydrogen generatorcooling system.

UNIT-4 — 15 Periods

ANALYSERS IN POWER PLANTS: Thermal conductive type – Paramagnetic type Oxygen Analyzer, IR type and trim Analyzer – spectrum analyzer – Hydrogen purity meter –

chromatography PH meter – conductivity cell – Fuel analyzer - brief survey of pollution monitoring and control equipment.	
Text Books :	1. Modern Power station practice: Volume 6, Instrumentation, Controls and Testing, Pergaman Press, Oxford 1971. 2. Wakil. M.M.; Power Plant Technology (McGraw Hills), 1985.
References :	1. Elonka S.M. and Kohal, Standard Boiler Operations Questions and Answers, TMH, 1975.

INTRODUCTION TO DATA ANALYTICS

Institutional Elective-I (Code: 18ITI01)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the use of R, Basics of R, Advanced data structures, reading/writing data into R.
- Understand the basic & advanced data management, manipulate data using SQL statementsand visualization of data using different plots.
- Understand the normal, binomial distributions, correlation and covariance, T-test, ANOVA,Manipulation string, and Linear models .
- Understand the cluster analysis and classification.

Course Outcomes: Students will be able to

CO-1	Import, review, manipulate and summarize data-sets in R.
CO-2	Understand advanced data structures like vectors, lists, matrices, arrays and data frame.
CO-3	Understand normal and binomial distributions and apply basic and advanced statistical tools.
CO-4	Understand the difference between Supervised and Un-supervised Machine Learning Algorithms.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	2						1							1	2
CO-2				3	2									1	2
CO-3				3	2									1	2
CO-4				3	2									1	2

UNIT-1 — 15 Periods

Introduction to R - Why use R?, Obtaining and installing R, The R Environment - Command line interface, RStudio,R Packages - Installing packages, loading packages, Building packages, Basics of R - basic Math, variables, Datatypes, vectors, calling function, function documentation, missing data. Advanced Data Structures- data.Frames, Lists, Matrices, Arrays, Reading Data into R-Reading CSVs, Excel data, reading from database.

UNIT-2 — 15 Periods

Basic Data Management - A working example, creating new variables, recoding variables, renaming variables, missing values, date values, type conversion, sorting data, merging data set, sub-setting datasets, Using SQL statement to manipulate data

UNIT-3 — 15 Periods

Normal distribution, binomial distribution, summary statistics, correlation and covariance, T-test, ANOVA, paste,sprintf, extracting text, regular expression, Simple linear regression, multiple linear regressions.

UNIT-4 — 15 Periods

Cluster Analysis-common steps in cluster analysis, calculating distances, Hierarchical cluster analysis,

Partitioning cluster analysis, avoiding nonexistence clusters, Preparing the data, logistic regression, decision trees, random forests, support vector machines, choosing a best predictive solution.	
Text Books :	1. R for Every One, Advanced analytics and graphics by Jared P Lander, Addison Wisley Data and Analyticsseries, 2017, 2nd edition. 2. R in Action, Data Analysis and graphics with R, Robert L Kaacoff, Manning Publisher,2015, 2nd.
References :	1. Beginning R by Dr.Mark Gardener, Wrox publisher, 2012, 1st edition. 2. Associate Analytics Facilitator Guide provided by NASSCOM http://183.82.43.252/~gopam/html/NASSCOM.

CYBER SECURITY

Institutional Elective-I (Code:18ITI02)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite:

Course Objectives: Students will be able to

- Understand about Security basics and Cryptographic algorithms.
- Understand how to secure computer system with Cryptographic algorithms and data integrity.
- Identify hacking basics information and privacy concepts.
- Gather the matter about Security in the networks & analyze, and various types of attacks in the computer system.

Course Outcomes: Students will be able to

CO-1	Explain basic security information and cryptographic algorithms.
CO-2	Explain principles of operation of Asymmetric Encryption techniques and integrity algorithms.
CO-3	Analyze hacking techniques and privacy concepts.
CO-4	Add security feature to computer networks and improve computer security.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	2	2	3	2	3	-	-	-	-	2	2	2	3	3	2
CO-2	2	3	2	2	2	-	-	-	-	2	2	2	3	2	2
CO-3	2	2	2	2	2	-	-	-	-	2	2	2	2	3	2
CO-4	2	2	2	2	2	-	2	2	-	2	-	2	3	2	2

UNIT-1 15 Periods

Int. to Computer Security: Definition of Computer Security, the OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms and A Model for Network Security.
Symmetric Ciphers: Classical Encryption Techniques, Block Ciphers and the DES, AES Techniques.

UNIT-2 15 Periods

Public Key Cryptography: Principles of Public-Key Cryptosystems, The RSA algorithm and Diffie Hellman Key Exchange Algorithm.
Digital Signatures: Properties, Attacks and Forgeries, Digital Signature Requirements, Direct Digital Signature and Elgamal Digital Signature Scheme.

UNIT-3 15 Periods

Hacking: Basic Terminology, Hacker's Motives and Objectives, Hacker Classes, Hacking Phases and Role of an Ethical Hacker.
Privacy in Cyberspace: Privacy Concepts, -Privacy Principles and Policies, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies.

UNIT-4 15 Periods

Information gathering tools: Recon-ng, Dmitry, Net discover and Nmap.
Network Scanning: Objectives of Network Scanning, TCP/IP protocol stack, Types of Network Scanning.
Security of Computer Systems: Malware attacks, Password attacks.

Text Books : 1. Cryptography and Network Security - Principles & Practice, William

	Stallings, Pearson, 7 edition, 2017. ISBN: 978-0-13-444428-4
References :	1. Cryptography and Network Security, Behrouz A. Forouzan and Debdeep Mukhopadhyay, Mcgraw-Hill Education 2, 2010. ISBN: 978-93-392-2094-5 2. CISSP All-in-One Exam Guide, Shon Harris and Fernando Maymi, McGraw-Hill Education 7, 2016, ISBN: 978-0-07-184961-6. 3. Gray Hat Hacking: The Ethical Hackers Handbook, Allen Harper, Shon Harris, McGraw-Hill Edition 3, 2011. ISBN: 978-0-07-174256-6 4. Security in Computing, Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Pearson Edition 5, 2015. ISBN: 78-0-13-408504-3. DOI: www.wileyindia.com

FLUID POWER & CONTROL SYSTEMS

Institutional Elective-I (Code: 18MEI01)

Lectures	:	4 Periods/Week,	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- To acquire knowledge in fluid power sources, power utilization and trouble shooting.
- To understand and develop hydraulic circuits for various applications.
- To understand and develop pneumatic circuits used in automation.
- To understand the importance and uses of accumulator.

Course Outcomes: Students will be able to

CO-1	Categorize fluid power systems and understand the working of hydraulic power sources and actuators
CO-2	Illustrate the construction and working of control elements in hydraulic and pneumatic circuits.
CO-3	Select suitable pneumatic circuit for various industrial applications.
CO-4	Understand the function of an accumulator and Identify faults in hydraulic systems and maintenance ofhydraulic system

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1		2		1											
CO-2	2	2												3	
CO-3	1	3	1										2		
CO-4	1	1											1	2	

UNIT-1 — 15 Periods

Introduction: Fluid Power, Basic Law, Application of Fluid Power, Advantages of Fluid Power Systems, Typesof Fluid Power Systems.
Hydraulic Systems: Pumps – Gear Pumps and Vane Pumps. Selection and Specification of Pumps. HydraulicActuators: Linear and Rotary Actuators.

UNIT-2 — 15 Periods

Control and Regulation Elements: Pressure, Flow and Direction Control Valves Hydraulic Circuits: Reciprocation, Quick Return, Sequencing, Synchronizing Circuits, Industrial Circuits - Punching Press Circuit, Milling Machine Circuits

UNIT-3 — 15 Periods

Introduction to Pneumatic Systems: Pneumatic fundamentals, Pneumatic Valves Pneumatic Circuits: Pneumatic circuits- Basic pneumatic circuit, Quick exhaust circuit, feed control circuit and Time delay circuit.

UNIT-4 — 15 Periods

Hydraulic Circuits: Accumulators, Accumulator Circuits – Leakage Compensation, Auxiliary Power Source, Emergency Source of Power Maintenance of Hydraulic Systems: Maintenance of Hydraulic Systems, Trouble Shooting of Hydraulic System.

Text Books :	1. Anthony Esposito 'Fluid Power with applications" Pearson Education. 2. Andrew Parr " Hydraulics and Pneumatics-A technicians and engineers guide" Jaico publishing co.
References :	1. W.Bolton,"Pneumatic and Hydraulic systems" Butterworth-Heinemann **Web page references** 1. https://www.grc.nasa.gov/www/k-12/WindTunnel/Activities/Pascals_principle.html 2. http://www.vickers.sh.cn/pdfs/M-SRSR-MC001-E.pdf 3. http://file.seekpart.com/keywordpdf/2011/3/31/20113319837232.pdf 4. http://www.associatedgroups.com/EATON-CAT/pdfs/i3155s.pdf

PROJECT MANAGEMENT Institutional Elective-I (Code: 18MEI02)					
Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite:

Course Objectives: Students will be able to

- To acquire the knowledge of planning a project
- To perform SWOT analysis of project
- To use PERT and CPM techniques in implementing a project
- To learn to manage a project

Course Outcomes: Students will be able to

CO-1	Develop work breakdown structure
CO-2	Apply critical path, risk analysis using PERT Methods
CO-3	Apply scheduling of resources for a given project purpose relevant cost
CO-4	Develop organization structure for a project &identify the appropriate leadership style

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	2	3	3	1	3	3	3	3			3		3		3
CO-2	3	3	3	3	3	3	3	3			3		3		3
CO-3	3	3	3	3	3	3	3	3			3		3		3
CO-4	3	3	3	1		3	3	3			3		3		3

UNIT-1 — 15 Periods

Introduction to Project Management - Definitions, scope and contents, Relevance, Classification of Projects, Defining the Project, Project Life Cycle, WBS, Project Life cycle, Developing a project Plan, Network analysis, Exercises

UNIT-2 — 15 Periods

Critical path method, Risk analysis, PERT; problems, Reducing Project Duration

UNIT-3 — 15 Periods

Estimating project Times and Costs, Scheduling Resources and Costs, problem solving, Progress and Performance Measurement

UNIT-4 — 15 Periods

Organization – Structure and Culture, Designing a structure for a project, Leadership styles, Leading, Managing Project Teams. The Project Management Maturity Model (PMMM)

Text Books :	1. Harold Kerzner, "Project Management", 8 th Edition, Wiley, New York, 2003. (pdf available) 2. Project Management: The Managerial Process, Erik W. Larson, and Clifford F. Gray. McGraw-Hill Higher Education
References :	1. A Guide to the Project Management Body of Knowledge (PMBOK guide), PMI, 2017 2. Prasanna Chandra, "Projects – Planning, analysis, selection, implementation and review",Tata McGraw-Hill, New Delhi, 2010.

LINEAR ALGEBRA
Institutional Elective-I (Code: 18MAI01)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None

Course Objectives: Students will learn how to

- Verify a vector Space, check for basis and find the rank.
- To le Find the eigen values and eigven vectors, diagonalization of a square matrix and finding higher power of a given square matrix.
- Define an inner product inner product, orthogonal projections, Gram-Schmidt orthogonalization process, least square solution of a system.
- To learn diagonalization of symmetric matrices and singular value decomposition of a matrix.

Course Outcomes: After studying this course, the students will be able to

CO1	Appy the definition for verification of a vector space, Change of basis and finding dimension of a vector space
CO2	Find matrix representation of a transformation, eigven values, eigen vectors and diagonalization of a matrix and its power matrix
CO3	Use the knowledge for orthonormal basis. Method of least square to fit a polynomial for the given data
CO4	To diagonalize a symmetric matrix and singular value decomposition of a matrix.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3										2	2		
CO2	3	2										3	2		
CO3	3	3		2								2	3		
CO4	2	2										3	3		

UNIT-1 15 Periods

Vector Spaces:
Vector Space and Subspaces, Null Spaces, Column Spaces and Linear Transformations, Linear Independent Sets, Bases, The dimension of a vector space, Rank.
[Sections 4.1, 4.2, 4.3 4.5, and 4.6]

UNIT-2 15 Periods

Eigen Values and Eigen Vectors:
Eigen Vectors and Eigen values, The Characteristic Equation, Diagonalization, Eigen Vectors and Linear Transformations.
[Sections 5.1, 5.2, 5.3, and 5.4]

UNIT-3 15 Periods

Orthogonality and Least Squares:

Inner Product, Length, and Orthogonality, Orthogonal Sets, Orthogonal Projections, The Gram–Schmidt Process, Least-Squares Problems. [Sections 6.1, 6.2, 6.3, 6.4 and 6.5]	
UNIT-4	15 Periods
Symmetric Matrices and Quadratic Forms: Diagonalization of Symmetric Matrices, Quadratic Forms, Constrained Optimization, The Singular Value Decomposition. [Sections 7.1, 7.2, 7.3 and 7.4]	
Text Books :	1. Linear Algebra And Its Applications by David C. Lay, Steven R. Lay and Judi J. McDonald 5th edition, Pearson, 2016.
References :	1. "Linear Algebra And Its Application" by Gilbert Strang, 4th edition, Cengage India Limited,2014.

NANO MATERIALS AND TECHNOLOGY
Institutional Elective-I (Code: 18PHI01)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None

Course Objectives: Students will learn how to

- Understand the concepts of nanoscience and synthesis of nano materials
- Learn the nano scale paradigm in terms of various properties
- Gain the knowledge of specific characterization technics of nanomaterials and nanotubes
- Get scientific understanding of applications of nanomaterials in agriculture, medicine, Biology, defense etc.

Course Outcomes: The students will be able to

CO1	Scale up synthesis of nanomaterials and understand quantum confinement
CO2	Understand properties of nanomaterials and nano tubes
CO3	Know the characterization techniques of nano materials
CO4	Know the usage of nano particles in nano biology and nano medicine.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3	2											2		
CO-2	3	2											2		
CO-3	2		2	2									2		
CO-4	2				2								2		

UNIT-1 15 Periods

ADVANCED OPTICS

I NTRODUCTION TO NANO TECHNOLOGY: history of Nano materials nano scale, conventional and Nano materials differences, quantum confinement, quantum wells, quantum wires, quantum dots, surface to volume ratio, nano ceramics, nano composites and nano clusters .

SYNTHESIS OF NANOMATERIAL: Bottom up and top down approaches, cryo rolling, high energy ball milling, chemical vapour deposition, solgel method, laser ablation, rapid solidification processing, equal channel angular extrusion, molecular beam epitaxy, sputtering ,hydrothermal method, physical vapour deposition and electro deposition.

UNIT-2 15 Periods

PROPERTIESOFNANOMATERIALS: Electrical, magnetic, optical, physical, chemical, mechanical, thermal and electro-chemical properties.

CARBON NANOMATERIALS: Nanotubes, graphene, bucky balls, nano horns, properties of carbon nanotubes, synthesis of carbon nano materials, application of carbon nano tubes.

UNIT-3 15 Periods

CHARACTERIZATION OF NANO MATERIALS:X-ray diffraction, scanning electron microscopy, uv-visible spectroscopy, scanning tunnelling microscopy, differential thermal

analysis and differential scanning calorimetry , FTIR.		
UNIT-4		15 Periods
APPLICATION OF NANOMATERIALS: Electronics, computers, biomedical, mechanical, chemical, coatings, optoelectronic, environmental, sensors ,aerospace, textiles, cosmetics and medical applications.		
Text Books :	1. Kulkarni Sulabha K,Nano technology: Principles and Practices, capital publishing company, 2007. 2. Stuart M.Lindsay, Introduction to nano science ,Oxford University Press, 2009.	
References :	1. Robert Kelsall ,Iam Hamley, Mark Geoghegan, Nanoscale, Scince and Technology, John Wiley & Sons, 2005.	

FIBER OPTICS COMMUNICATIONS

Institutional Elective-I (Code: 18PHI02)

Lectures	:	4 Periods/Week Credits - 3	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None

Course Objectives: Students will learn how to

- Get the concepts of optical fibers and losses and distortion of optical signals
- Understand the optical sources to fiber couplings and fiber to fiber joints
- Gain the knowledge of optical communication link analysis
- Learn the attenuation measurement and fault-finding technics

Course Outcomes: The students will be able to

CO1	identify signal degradation and losses in optical fibers
CO2	understand power launching and coupling in optical fibers
CO3	compute optical fiber link design parameters
CO4	measure optical parameters and optical signal losses.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	2	2											2		
CO-2	2	2											2		
CO-3	2		2										2		
CO-4	2			2	2								2		

UNIT-1 15 Periods

Fiber optical wave guides :Introduction ,total internal reflection ,types of fibers,planar dielectric wave guide, optical fiber wave guides-inter-modal dispersion ,single mode fibers,low dispersion fibers.

Signal degradation in optical fibers :Attenuation, Absorption, Scattering losses, Radioactive losses signal distortion in optical wave guides ,information capacity determination, intra model dispersion(material dispersion, wave guide dispersion**)**

UNIT-2 15 Periods

Power launching and coupling: Source to fiber power launching, source output pattern power-coupling calculation ,power launched verss wave length, equilibrium numerical. Aperture lensing schemes for coupling improvement nanimaging micro sphere. Laser diode-to-fiber-coupling,fiber-to-fiber joints, mechanical misalignment ,fiber-related losses, fiber end face preparation, fiber splicing optical fiber connectors**.**

UNIT-3 15 Periods

Transmission link analysis :point –to-point links, system consideration, link power budget, rise time budget ,transmission distance for single model links ,wave length division multiplexing (WDM) passive components ,the 2x2 fiber coupler ,the 2x2 wave guide coupler ,star coupler, local area network .

UNIT-4	15 Periods
Measurement attenuation Measurement ,the cut back technique, insertion loss method optical time domain reflectometer. dipersion measurement – inter modal diaspersion, time domainter modal diaspersion measurement, Frequency domain inter modal diaspersion measurement, OTDR fiber application, OTDR Trace ,attenuation measurments fiberfault location.	
Text Books :	1. Willam J&Hawkes F.B opto electronics :An introduction.(PHI) 2. Gerd Keiser optical fiber communication (3 rd edition Mc GrawHill)
References :	1. A .Selvarajan ,S .Kar,and T.SRINIVAS , fiber optic communications ,Tata Mc GrawHill,2002. 2. D.C Agarwal "fiber optics in communications "Wheeler publishing,1993.

Annexure – 2
Institution Elective - II

BAPATLA ENGINEERING COLLEGE::BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Computer Science and Engineering

List of Institutional Electives

Institutional Elective-II	
18CEI03	Disaster Management
18CEI04	Remote sensing & GIS
18CSI03	Python Programming
18CSI04	Computer Networks
18ECI03	Wireless Communications
18ECI04	Artificial Neural Networks
18EEI03	High Voltage Engineering
18EEI04	Electrical Energy Conservation and Auditing
18EII03	Robotics and Automation
18EII04	Sensors And Signal Conditioning
18ITI03	Mobile Application Developments
18ITI04	Web Technologies
18MEI03	Non-Conventional Energy Sources
18MEI04	Automobile Engineering
18MAI02	Graph Theory
18PHI03	Advanced Materials
18PHI04	Opto Electronic Devices And Applications
18ELI03	Professional Communication

DISASTER MANAGEMENT

Institutional Elective-II (Code: 18CEI03)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Clear knowledge of Disaster, Hazards and Vulnerabilities.
- Knowledge of Mechanism of Disaster Management.
- Clear idea of Capacity Building.
- Explains how to do the planning for disaster management.

Course Outcomes: The student will be able to

CO-1	Understand the importance of Disaster Management.
CO-2	Exposure on Basic mitigation techniques of various disasters.
CO-3	Knowing about various responding agencies for different kinds of Disasters.
CO-4	Enhancing the knowledge of recovery methodologies after Disaster.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1						2	1			2		2	1	1	
CO-2			1		1	2	3		2	2		2	1	1	
CO-3						1	1		3	2		2			
CO-4			1		1	3	3		3	2		3	1	2	2

UNIT-1 — 15 Periods

Understanding Disaster: Concept of Disaster - Different approaches- Concept of Risk - Levels ofDisasters - Disaster Phenomena and Events (Global, national and regional)

Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazardassessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk- Vulnerabilities to flood and earthquake hazards.

UNIT-2 — 15 Periods

Disaster Management Mechanism: Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief.

UNIT-3 — 15 Periods

Capacity Building: Capacity Building: Concept - Structural and Nonstructural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in Disaster Management - Legislative Support at the state and national levels

UNIT-4 — 15 Periods

Coping with Disaster: Coping Strategies; alternative adjustment processes – Changing Concepts ofdisaster management - Industrial Safety Plan; Safety norms and survival kits -Mass media and disaster management.

Planning for disaster management: Strategies for disaster management planning - Steps for formulatinga disaster risk reduction plan - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and district disaster management plans.

Text Books :	1. Manual on Disaster Management, National Disaster Management, Agency Govt of India. 2. Disaster Management by Mrinalini Pandey Wiley 2014. 3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley2015.
References :	1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009. 2. National Disaster Management Plan, Ministry of Home affairs, Government of India (http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

REMOTE SENSING & GIS

Institutional Elective-II (Code: 18CE104)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Learn basic concepts of Aerial Photographs.
- Learn basic concepts of remote sensing and its characteristics, satellite sensors and platforms.
- Know about satellite digital image processing and classification techniques.
- Understand the basic concepts GIS, spatial data and analysis
- Applications of GPS in surveying.
- Know various remote sensing and GIS applications in civil engineering

Course Outcomes: Students will be able to

CO-1	Analyse the principles and components of photogrammetry & Interpret Information from Aerial Photographs.
CO-2	Acquaintance with the Foundations of Remote Sensing, Satellite Sensors and Platforms, and Hands-On Experience with Satellite Image Classification.
CO-3	Acquire a Fundamental Knowledge of Geographic Information Systems and Cartography. Evaluation of Spatial Data using Overlay Techniques Exposed.
CO-4	Discover Ways to Utilise GPS to GeoTag Assets, Add Attributes and Metadata, and Improve Your Awareness of Remote Sensing and GIS in Civil Engineering Applications.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3	2	1	2					2						
CO-2	3	2		2	3				3		3		3		
CO-3	3	2		2	3				2		3		3		
CO-4	3	2			3				3		1		3		

UNIT-1 15 Periods

PHOTOGRAMMETRY: Fundamentals of Photogrammetry and Photo interpretation – types of photographs; Vertical photographs – principal point; scale; Stereoscopy; Overlap, side lap and flight planning.

UNIT-2 15 Periods

REMOTE SENSING: Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere and target.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, Space-borne remote sensing. Visual Interpretation Techniques. Overview of Indian Remote sensing satellites and sensors, satellite definition and types, characteristics of satellite, characteristics of satellite orbit

UNIT-3 15 Periods

GEOGRAPHIC INFORMATION SYSTEM (GIS): Introduction, key components, data entry &preparation – Spatial data input, Raster Data Model, Vector Data Model, Raster Vs Vector, advantages and disadvantages of Raster & Vector network analysis - concept and types,

Data storage-vector data storage, attribute data storage.	
UNIT-4	15 Periods
GLOBAL POSITIONING SYSTEM (GPS)&RS AND GISAPPLICATIONS:GPS definition, components of GPS, GPS receivers. Space, Control and User segments of GPS. Advantages and disadvantages of GPS, Limitations and applications of GPS Indian Systems (IRNSS, GAGAN)Development of GPS surveying techniques, Navigation with GPS, Applications of GPS. **Applications**: Photogrammetry, Remote Sensing and Geographical information Systems.	
Text Books :	1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press 2. Chang, K. T. (2006). Introduction to Geographic Information Systems. The McGraw-Hill. 3. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi 4. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers. 5. Parkinson, B. W., Spilker, J. J. (Jr.) (1996). Global Positioning System: Theory & Applications(Volume-I). AIAA, USA
References :	1. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013. 2. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt.Ltd, 2013. 3. Jensen John R. Introduction to Digital Image Processing: A Remote Sensing Perspective Prenticehall, New Jersey 4. Paul Wolf, Elements of Photogrammetry, McGraw Hill. 5. Leick Alfred, 1995: GPS Satellite Surveying, Wiley Inter science 6. Burrough, P. P. & McDonnel, R. A. (1998). Principles of GIS. Oxford University Press.

PYTHON PROGRAMMING

Institutional Elective-II (Code: 18CSI03)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand and write code using the basics of Python, Statements, Expressions, ConditionalExecutions, and Functions.
- Write code for Iteration, Strings, File I/O.
- Write code in creating, usage of Lists, Dictionaries, and Tuples.
- Understand the concepts of Object Orientation, Databases and write code implementing them.

Course Outcomes: Students will be able to

CO-1	Understanding of scripting and the contributions of python language.
CO-2	Understanding of Python especially the object-oriented concepts, using databases.
CO-3	Able to design and implement machine learning solutions to classification, regression.
CO-4	Able to design and implement machine learning solutions to clustering problems and featuresof various data.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3	2	1	-	3	-	-	-	-	1	-	2	3	1	-
CO-2	3	2	1	-	3	-	-	-	-	1	-	2	3	2	1
CO-3	3	2	2	2	3	-	-	-	-	1	1	2	3	2	1
CO-4	3	2	2	2	3	-	-	-	-	1	2	2	3	2	1

UNIT-1 15 Periods

Introduction: Overview, History of Python, Python Features, Environment Setup. Variables, expressions, and statements: values and types, variables, names and keywords, statements, operators and operands, expressions, order of operations, modulus operator, string operations, asking the user for input, comments, choosing mnemonic variable names.

Conditional execution: Boolean expressions, logical operators, conditional execution, Alternative execution, chained conditionals, nested conditionals, catching exceptions using try and except, short-circuit evaluation of logical expressions.

Iteration: updating variables, the while statement, infinite loops and break, finishing iterations with continue, definite loops using for, loop patterns.

UNIT-2 15 Periods

Functions: function calls, built-in functions, type conversion functions, random numbers, math functions, adding new functions, definitions and uses, flow of execution, parameters and arguments, fruitful functions and void functions.

Strings: string is a sequence, getting the length of a string using len, traversal through a string witha loop, string slices, strings are immutable, looping and counting, the in operator, string comparison, string methods, parsing strings, format operator.

FileI/O: persistence, opening files, text files and lines, reading files, searching through a file,

letting the user choose the file name, using try except and open, writing files.	
UNIT-3	15 Periods
Lists: a list is a sequence, lists are mutable, traversing, operations, slices, methods, deleting elements, functions, strings, parsing lines, objects and values, aliasing, arguments. **Tuples**: tuples are immutable, comparing tuples, tuple assignment, dictionaries and tuples, multiple assignment with dictionaries, the most common words, using tuples as keys in dictionaries, sequences. **Sets:** Introduction, access set items, add set items, remove set items, loop sets, join sets, set methods. **Dictionaries:** Dictionary as a set of counters, dictionaries and files, looping and dictionaries, advanced text parsing.	
UNIT-4	15 Periods
Regular Expressions: Character matching in regular expressions, Extracting data using regular expressions, Combining searching and extracting, Escape character**.** **Object-Oriented Programming:** Managing Larger Programs, Using Objects, starting with Programs, Subdividing a Problem–Encapsulation, First Python Object, Classes as Types, Object Lifecycle, Many Instances. **Using Databases and SQL:** Database concepts, Database Browser for SQLite, creating a database table, Structured Query Language summary, Basic data modeling, Programming with multiple tables, three kinds of keys, Using JOIN to retrieve data.	
Text Books :	Python for Everybody, Charles Severance
References :	W3Schools - https://www.w3schools.com/python/ A Python Book: Beginning Python, Advanced Python, and PythonExercises, Dave Kuhlman, Open Source MIT License.

COMPUTER NETWORKS

Institutional Elective-II (Code: 18CSI04)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses incomputer networking.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance

Course Outcomes: Students will be able to

CO-1	Understand and explain Data Communications System and its components and Identify the different typesof network topologies and protocols.
CO-2	Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
CO-3	Understand and building the skills of subnetting and routing mechanisms.
CO-4	Familiarity with the application layer protocols of computer networks, and how they can be used to assist innetwork implementation.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	1	1	1	-	1	-	1	1	-	3	1	1	1	2	1
CO-2	1	1	2	-	2	1	1	-	1	2	-	1	2	2	1
CO-3	2	2	2	1	1	-	-	-	3	1	1	2	1	3	1
CO-4	1	2	2	2	1	-	-	-	-	1	1	1	1	3	1

UNIT-1 — 15 Periods

Data Communications & Networking Overview: A Communications Model, Data Communications, DataCommunication Networking.

Protocol Architecture: The Need for Protocol Architecture, A Simple Protocol Architecture, OSI, The TCP /IPProtocol Architecture.

Digital Data Communication Techniques: Asynchronous & Synchronous Transmission, Types of Errors, ErrorDetection, Error Correction.

UNIT-2 — 15 Periods

Data Link Control: Flow Control, Error Control.

Network Layer:

Network Layer Design Issues: Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual- Circuit & Datagram Subnets.

Routing Algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing.

Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in

Datagram Subnets, Load Shedding, Jitter Control.	
UNIT-3	15 Periods
Quality of Service: Requirements, Techniques for Achieving Good Quality of Service The **Network Layer in theInternet:** The IP Protocol, IP Addresses, Internet Control Protocols. **The Transport Layer: The Transport Service:** Services Provided to the Upper Layers, Transport ServicePrimitives, Berkeley sockets **Elements of Transport Protocols:** Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing, Crash Recovery.	
UNIT-4	15 Periods
The Internet Transport Protocol (UDP): Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol. **The Internet Transport Protocols (TCP):** Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control, TCP Timer Management. **Application Layer: The Domain Name System (DNS):** The DNS Name Space, Resource Records, Name Servers.	
Text Books :	1. Behrouz A. Forouzan, ―Data Communications and Networking‖, 4th edition, TMH. 2. Tanenbaum, Computer Networks, 4th Edition, (Pearson Education / PHI).
References :	1. Wayne Tomasi, ―Introduction to Data Communications and Networking‖, PHI. 2. GodBole, ―Data Communications & Networking‖, TMH. 3. Nader F.Mir, ―Computer and Communication Networks‖, PHI

WIRELESS COMMUNICATION

Institutional Elective-II (Code: 18ECI03)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand basic fundamentals of wireless communications.
- To know the role of equalization in Mobile communication and to study different types of Equalizers and Diversity techniques.
- Differentiate various multiple access technique
- Demonstrate different wireless communication systems and standards (1G to 4G).

Course Outcomes: Students will be able to

CO-1	Understand the fundamental concepts of Cellular & Mobile communications
CO-2	Demonstrate knowledge equalization and different diversity techniques
CO-3	Compare different multiple access techniques in mobile communication.
CO-4	Demonstrate different wireless communication systems and standards (1G to 4G)

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												**PSO's**		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	2	2	2	2	1	-	-	-	-	-	-	-	1	1	2
CO-2	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO-3	2	2	1	2	1	-	-	-	-	-	-	-	2	2	2
CO-4	2	2	1	2	2	-	-	-	-	-	-	-	2	2	2

UNIT-1 15 Periods

Cellular Mobile Communication Concepts: Evolution of mobile radio communications, Examples of wireless communication systems, Frequency re-use and channel assignment strategies, Handoff strategies, Interference and system capacity, co-channel and adjacent channel interference, Grade of service, Coverage and capacity enhancement in cellular network, cell splitting, sectoring, repeaters, microcells.

UNIT-2 15 Periods

Equalization: Fundamentals of equalizers, Equalizers in a communication receiver, Linear equalizers, Nonlinear equalizers: Decision feedback equalizers, Maximum likelihood sequence Estimation (MLSE) equalizer.

Diversity Techniques: Space diversity: Selection diversity, feedback, MRC, EGC diversity, Polarization diversity, Frequency diversity, Time diversity, Rake Receiver.

UNIT-3 15 Periods

Multiple Access in Wireless communications: Principle and applications of Multiple Access Techniques- FDMA, TDMA, CDMA, Spread Spectrum Multiple Access.

UNIT-4 15 Periods

Wireless Generations Technologies up to 3G:1G, TDMA-based 2G, IS-95, 2.5G, 3G development, Air interface technologies , Internet speeds of 2G, 2.5G, and 3G technologies,

Limitations of 3G, Quality of services (QOS) in 3G. **4GTechnology:**4G evolution, Advantages of 4G over 3G, Applications of 4G, Limitations of 4G.	
Text Books :	1. Theodore S. Rappaport, Wireless Communications Principles and Practice, 2ndEdition, PearsonEducation, 2003 (UNIT I, II, III). 2. G Sasibhusan Rao, Mobile Cellular Communications, Pearson Education, 2013(UNIT IV).
References :	1. W.C.Y. Lee, Mobile Cellular Communications, 2nd Edition, MC Graw Hill, 1995. 2. Yi-BingLin, ImrichChlamtac, Wireless and Mobile Network architectures, Wiley, 2001. 3. KamiloFeher, Wireless Digital Communications, PHI, 2003.

ARTIFICIAL NEURAL NETWORKS
Institutional Elective-II (Code: 18ECI04)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Certain fundamental concepts of artificial neural networks.
- Basic elementary patterns classifying neural nets and the fundamental ideas of patter association.
- Basic concepts of competitive networks and brief descriptions of certain competitive Networks.
- Various applications of Neural networks in different domains.

Course Outcomes: Students will be able to

CO-1	Understanding the functionality of Artificial Neural Model and implementation of different digitallogics using various neural models.
CO-2	Analyze the given pattern to one already stored in memory.
CO-3	Understanding A multilayer feed forward neural net with one or more hidden layers can learn anycontinuous mapping to an arbitrary accuracy.
CO-4	Learn variousapplications of Neural networks.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	2	2	-	3	-	-	-	-	-	-	-	-	3	2	2
CO-2	2	3	-	-	-	-	-	-	-	-	-	-	2	2	2
CO-3	-	2	-	3	-	2	-	-	-	-	-	-	3	3	-
CO-4	2	3	-	-	-	-	-	-	-	-	-	-	3	2	2

UNIT-1 15 Periods

ARTIFICIAL NEURAL NETWORKS: **BASIC CONCEPTS:**Introduction, Computation in terms of patterns, The McCulloch-Pitts Neural Model, The Perceptron, Neural Network Architectures, Activation Functions, Learning by Neural Nets

UNIT-2 15 Periods

PATTERN CLASSIFIERS: Hebb Nets, Perceptrons, Adaline, Madaline.

PATERN ASSOCIATORS: Auto-associative Nets, Hetero-Associative Nets, Hopfield Networks, Bi-directional Associative Memory.

UNIT-3 15 Periods

COMPETITIVE NEURAL NETS: The MAXNET, Kohonen's Self Organizing Map (SOM), Learning Vector Quantization (LVQ), Adaptive Resonance Theory(ART)

BACKPROPAGATION: Multilayer Feed forward Net, The Generalized Delta Rule, The Back propagation Algorithm.

UNIT-4 15 Periods

APPLICATIONS OF NEURAL NETWORKS:

Applications of Neural Networks in Forecasting, Applications of Neural Networks in

Healthcare, Applications of Neural Networks in Business, Applications of Neural Networks in image processing and compression, Applications of Neural Networks in control systems, Applications of Neural Networks in pattern recognition.	
Text Books :	1. Introduction to SOFT COMPUTING by Samir Roy and Udit Chakraborty, Pearson Publishing,2013.(Unit I,II, III) 2. Introduction to Neural Networks using Matlab 6.0 by S N Sivanandam, SSumathi, S N Deepa, Tata McGraw Hill Publishing,7th Reprint, 2008(Unit IV)
References :	

HIGH VOLTAGE ENGINEERING

Institutional Elective-II (Code: 18EEI03)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the breakdown phenomenon in solids, liquids and gases.
- Know the concepts of partial discharges and Identify the generation of high voltages.
- Employ different measuring techniques in high voltages and Know the protective techniques against over voltages.
- Interpret different testing techniques of different high voltage apparatus and Aware of the layout of high voltage laboratories.

Course Outcomes: Students will be able to

CO-1	Demonstrate the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
CO-2	Examine the generation and measurement of D. C., A.C., & Impulse voltages.
CO-3	Illustrate the standards needed to conduct tests on H. V. equipment and on insulating materials, as per the standards.
CO-4	Apply the knowledge of protection against over voltages and illustrate the layout of HV labs

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3	3	1	1									3		
CO-2	3	3	1	2									3	3	
CO-3	2	1	2	2									3	3	
CO-4	3	3	2	2									3		

UNIT-1 — 15 Periods

Breakdown phenomenon of Gases,Liquids and Solids: Ionization processes and de-ionization processes, Types of Discharge, Gases as insulating materials, Breakdown in Uniform gap, non-uniform gaps, Townsend's theory, Streamer mechanism, Corona discharge. Breakdown in pure and commercial liquids, Solid dielectrics and composite dielectrics, intrinsic breakdown, electromechanical breakdown and thermal breakdown, Partial discharge, applications of insulating materials.

UNIT-2 — 15 Periods

Generation of High voltages: Generation of high D. C. and A.C. voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

UNIT-3 — 15 Periods

Measurement of high voltages and currents: Measurements of Peak voltage, impulse voltage and high direct current measurement method, cathode ray oscillographs for impulse voltage and current measurement, measurement of dielectric constant and loss factor, partial discharge measurements. Protection against over-voltages, Surge diverters, Surge modifiers.

UNIT-4 — 15 Periods

High voltage testing techniques: Various standards for HV Testing of electrical apparatus, IS,

IEC standards, Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, power transformers and some high voltage equipment, High voltage laboratory layout, indoor and outdoor laboratories, testing facility requirements, safety precautions in H. V. Labs.	
Text Books :	1. High Voltage Engineering by M.S.Naidu and V.Kamaraju – TMH. 2. C. L. Wadhwa, "High Voltage Engineering", New Age International Publishers, 2007.
References :	1. High Voltage Engineering fundamentals by Kuffel and Zungel, Elsavier Publications 2. D. V. Razevig (Translated by Dr. M. P. Chourasia), "High Voltage EngineeringFundamentals", Khanna Publishers, 1993. 3. R. Arora and W. Mosch "High Voltage and Electrical Insulation Engineering", JohnWiley & Sons, 2011. NPTEL COURSE LINK: **i. NPTEL :: Electrical Engineering - High Voltage Engineering**

ELECTRICAL ENERGY CONSERVATION & AUDITING

Institutional Elective-II (Code: 18EEI04)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Understand the concept of energy conservation, energy management.
- Know the energy efficient motors and its characteristics.
- Understand the power factor improvement, lighting and different measuring instruments.
- Know the economic aspects of energy management.

Course Outcomes: Students will be able to

CO-1	Examine the principles of Energy audit and its process in thermal powerstation & analyze the different aspects of energy management.
CO-2	Describe the characteristics of energy efficient motors.
CO-3	Illustrate the power factor improvement, good lighting system practice and the types of energy instruments.
CO-4	Analyze the economic aspects of Energy Management.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3	-	-	-	-	-	-	3	2	-	1	3	-	-	1
CO-2	3	-	-	-	-	2	-	-	-	-	3	-	-	1	2
CO-3	3	-	4	-	-	2	3	-	-	-	-	4		2	1
CO-4	3	-	-	-	-	-	-	2	3	-	1	3		-	1

UNIT-1 — 15 Periods

Basic Principles of Energy Audit: Energy audit - definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes - Energy saving potential, energy audit of thermal power station, building energy audit.

Energy Management: Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting, Energy manger, Qualities and functions, language, Questionnaire - check list for top management.

UNIT-2 — 15 Periods

Energy Efficient Motors: Energy efficient motors, factors affecting efficiency, loss distribution, constructional details. Characteristics - Variable speed, variable duty cycle systems, Voltage variation -Voltage unbalance - Over motoring - Motor energy audit.

UNIT-3 — 15 Periods

Power Factor Improvement, Lighting & Energy Instruments: Power FactorImprovement, Lighting: Power factor – Methods of improvement, location of capacitors, Pf with non-linearloads, effect of harmonics on power factor. Power factor motor controllers - Good lighting system design and practice, lighting control, lighting energy audit. Energy Instruments: Watt meter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLC's.

UNIT-4 — 15 Periods

Economic Aspects and Analysis: Economics Analysis - Depreciation Methods, time value of

money, rate of return, present worth method , replacement analysis, life cycle costing analysis - Energy efficient motors, Calculation of simple payback method, net present worth method - Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.	
Text Books :	1. W.R. Murphy and G. Mckay, "Energy Management", Butter worth Publications. 2. John. C. Andreas, "Energy Efficient Electric Motors", Marcel Dekker Inc Ltd, 2nd Edition, 1995.
References :	1. Paul O' Callaghan, "Energy Management", Mc-Graw Hill Book Company, 1st Edition, 1998. 2. W.C.Turner, "Energy Management Hand Book", A John Wiley and Sons. 3. S. C. Tripathy, "Utilization of Electrical Energy", Tata McGraw Hill, 1993. 4. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects (available online). 5. L.C. Witte, P.S. Schmidt and D.R.Brown, "Industrial Energy Management and Utilization", Hemisphere Publication, Washington, 1998

ROBOTICS AND AUTOMATION

Institutional Elective-II (Code: 18EII03)

Lectures	:	4 Periods/Week	Continuous Assessment	:	30
Final Exam	:	3 Hours	Final Exam Marks	:	70

Pre-Requisite: None.

Course Objectives: Students will be able to

- To understand the basic anatomy of robots and trajectory planning
- To enable students to understand about the work envelopes of robots and its role inautomation
- To give an overview of the various methods of control of robots
- To select robots based on their applications and their related issues in industrial automation

Course Outcomes: Students will be able to

CO-1	Expertise in fundamentals of Robotics (Unit I)
CO-2	Understand the issues related to end effectors and sensors (Unit II)
CO-3	Acquire knowledge in Programming and control of Robots (Unit III)
CO-4	Understand the issues related to implementation of Industrial Automation with RobotApplications

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3	2	2						2	1	2	3	2		
CO-2	2	2	3	1	2				2	2	1	1	3		
CO-3	3	3	3	1	3				2	2	2	1		2	
CO-4	2	2	2	2	2		2		3	2	2	1		3	

UNIT-1 15 Periods

Fundamentals of Robots: Definition –Historical background- Robot Anatomy : Polar, Cylindrical, Cartesian coordinate, Joint-arm configuration–Work volume– Robot Drive System : Hydraulic, Electric, Pneumatic – Control System: Limited sequence, Play backwith point to point and Continuous path control Intelligent Robots- Dynamic performance: Speed of response and Stability - Precision of movement: Spatial Resolution, Accuracy, Repeatability and Compliance – Introduction to End effectors, Robotic Sensors, Robot Programming and work cell control.

UNIT-2 15 Periods

Robot End Effectors, Sensors, End Effectors: Types-Mechanical grippers-Magnetic grippers, Vacuum cups, Adhesive gripper, Hooks and Scoops- Tools as end effectors - Robot/ End-effectors, interface- Consideration in Gripper selection and Design.

Sensors: Transducers and Sensors – Sensors in Robotics: Tactile, Proximity, and Range Sensors, Miscellaneous sensors and sensor based systems- Machine Vision System.

UNIT-3 15 Periods

Programming and Control of Robots :Robot Programming: Methods of Programming-: Lead through Methods, Robot program as a path in space- Motion interpolation, WAIT, SIGNAL and DELAY Commands, Branching, Capabilities and limitations of Lead through Methods-

Textual Robot Programming- structure, Motion, End effectors and Sensor commands, Program

control communication, Monitor mode commands Robot Control: Open and Closed loop control- control Problem- Linear control Schemes- Design of Partitioned PD,PID and Adaptive Controllers for Linear Second order SISO Model of robot and their Block schematic representation- Control of Industrial Robots Using PLCs.

UNIT-4	15 Periods

Automation: Factory Automation: Fixed Automation, Flexible Automation and Programmable Automation. Intelligent Industrial Automation, Industrial
Networking, Bus Standards Automatic Feeders, Automatic Storage and Retrieval Systems (AS/RS), Transfer Lines, Automatic Inspection Systems Applications of Robots, Factorsinfluencing the selection of Robots – Robots for Welding, Painting, Assembly, Nuclear,Thermal and Chemical Plants.
Introduction to Mobile Robots, Legged Robots and Remote Controlled Robots, Automated Guided Robots, Micro Robots – Control and Safety Issues.

Text Books :	1. Groover, M.P., Weiss, M., Nagel, R.N., Odrey, N.G., Industrial Robots: Technology, Programming and Applications, McGraw-Hill Book Company, 2012. 2. Mittal R K, Nagrath I J, "Robotics and control", Tata McGraw Hill, 2010.
References :	1. Groover, M.P., Automation, Production Systems,and Computer-Integrated Manufacturing, Prentice-Hall of India Private Limited, New Delhi, 2007. 2. S.R.Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill, 1994. 3. Yoran Koren, Robotics for Engineers, McGraw Hill, 1980. 4. Saeed B. Niku, An Introduction to Robotics- Analysis, Systems, Applications, SecondEdition, John Wiley & Sons Inc., 2010. 5. Wesley, E. Sryda, "Industrial Robots: Computer interfacing and Control" PHI, 1985.

SENSORS AND SIGNAL CONDITIONING
Institutional Elective-II (Code: 18EI104)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Describe the basics of sensors, their static and dynamic characteristics, primary sensors for common quantities, working principles of resistive sensors and various methods of signal condition of resistive sensors.
- Study various reactive variation sensors and design of signal condition circuitsfor these sensors
- Know various self generating sensors and design of signal condition circuits for these sensors
- Understand the working principles of various digital and Intelligent sensors

Course Outcomes: Students will be able to

CO-1	List the characteristics of sensors and their significance
CO-2	State applications of resistive sensors and design a signal conditioning circuit fora given resistive sensor.
CO-3	State the working principles of self generating sensors, their applications designa signal conditioning circuit for a given self generating sensor
CO-4	List various digital sensors and their applications

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	2														
CO-2	3	3	3	2	3										
CO-3	3	3	3	2	3										
CO-4	2	2													

UNIT-1 15 Periods

Introduction to sensor-based measurement systems: General concepts and terminology, sensor classification, general input-output configuration, static and dynamic characteristics of measurement systems, primary sensors.

Resistive sensors : potentiometers, strain gauges, resistive temperature detectors,thermistors.

Signal conditioning for resistive sensors: Measurement of resistance, voltage dividers, Wheatstone bridge-balance measurements, Wheatstone bridge- deflection measurements, differential and instrumentation amplifiers, interference.

UNIT-2 15 Periods

Reactance variation and electromagnetic sensors: capacitive sensors, inductive sensors-variable reluctance sensors, eddy current sensors, linear variable differential transformer, electromagnetic sensors.

Signal conditioning for reactance variation sensors: problems and alternatives,ac bridges, carrier amplifiers and coherent detection, specific signal conditioningfor capacitive sensors.

UNIT-3 15 Periods

Self generating Sensors: thermocouples, piezoelectric sensors, photovoltaic sensors, electrochemical sensors.

Signal conditioning for self-generating sensors: Chopper and low-drift amplifiers,

electrometer and transimpedance amplifiers, charge amplifiers, noisein amplifiers, noise and drift in resistors.	
UNIT-4	15 Periods
Digital and Intelligent sensors: Position encoders, resonant sensors, variable oscillators, conversion to frequency, period or time duration, direct sensor-microcontroller interfacing, communication systems for sensors, intelligent sensors.	
Text Books :	1. Raman Pallas – Areny, John G. Webster: Sensors and signalconditioning, second edition, John Wiley and sons.
References :	1. Walt Kester: Practical design techniques for sensor signal conditioning, Analog devices and Prentice Hall.

MOBILE APPLICATION DEVELOPMENT

Institutional Elective-II (Code: 18ITI03)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: Object Oriented Programming using Java.

Course Objectives: Students will be able to

- Understand basic concepts of Android platform.
- Learn Android UI palette.
- Familiarize with Building blocks of Android App.
- Understand working with Mobile hardware in Apps.

Course Outcomes: Students will be able to

CO-1	Apply Java programming concepts to Android App development.
CO-2	Develop User interfaces for Android Apps.
CO-3	Use the mobile sensors, google maps & multimedia in Apps.
CO-4	Develop a full featured Android Apps

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3	3	3		3		2		2	2	2		1		
CO-2	3				2		1		2	2			1		
CO-3	3		3		3		2				2			1	2
CO-4	1								2	1	2			2	

UNIT-1 — 15 Periods

Introduction: Android background, Android SDK features, Android Software Stack, Android Development Tools, Types of Android applications, Hardware imposed design considerations, Practical application design considerations.

Creating Applications & Activities: Creating basic Android application using Android Studio, Exploring Android Studio IDE, Application Manifest file, Using the Manifest Editor, Using Resources.The Activity Life Cycle.

Building User Interfaces: Basic Views, Picker views, List views, View Groups, Android Layouts, Fragments -Fragment Life Cycle, working with Android fragments, using Adapters.

UNIT-2 — 15 Periods

Advanced Views: Image View, Grid View, Image Switcher, Working with Menus, Web View, Working with Dialogs – Alert Dialog, Progress Dialog, Date Picker Dialog, Time Picker Dialog, Character Picker Dialog.

Intents and Broadcast Receivers: Using Intents to launch Activities, Returning results from Activities, Using intents to broadcast events; Pending Intents, Intent filters & Broadcast Receivers - using Intent Filters to serviceImplicit Intents, Listening for Native Broadcast Intents.

Files, Saving State & Preferences: Working with the File System, Saving & Restoring Activity Instance stateusing Life cycle Handlers, Saving & Retrieving Shared Preferences.

Using Internet Resources: Downloading files using Download Manager.

UNIT-3 — 15 Periods

Databases: SQLite, Content Values & Cursors, Working with SQLite databases.
Content Providers: Creating Content Providers, Using Content Providers, Native Android Content Providers.
Messaging & Notifications: Sending SMS & MMS using Intents, sending SMS using SMS Manager, Receiving SMS Messages. Notifications - Creating Notifications, Using Standard Notification UI, Creating a Custom Notification UI, Triggering, Updating & Canceling Notifications.
Working in the Background: Creating and Controlling Services, Binding Services to Activities. Creating andRunning Asynchronous Tasks, Manual Thread Creation.

UNIT-4	15 Periods

Hardware Sensors: Supported Android Sensors, Virtual Sensors, Monitoring Sensors, Interpreting Sensorvalues, using Accelerometer & Proximity sensors.
Maps & Location Based Services: Using the emulator with location based services, Finding and Tracking yourlocation, using proximity alerts, using the Geocoder, map based activities.

Audio, Video and using the Camera: Playing Audio and Video, Recording Sound, Recording Video, usingCamera.

Text Books :	1. "Professional Android 4 Application Development", Reto Meier, John Wiley & Sons, Inc., 2012. 2. "Beginning Android Programming with Android Studio", J. F. DiMarzio, 4th edition, John Wiley & Sons,Inc., 2017.
References :	1. Head First Android Development - A Brain Friendly Guide, Dawn Griffiths & David Griffiths, O' Reilly. 2. Introduction to Android Application Development - Developer's Library, Joseph Annuzzi, Jr.LaurenDarcey& Shane Conder, 5th ed., Addison-Wesley.

WEB TECHNOLOGIES

Institutional Elective-II (Code: 18ITI04)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: C Programming.

Course Objectives: Students will be able to

- Analyze a web page and identify HTML elements and their attributes.
- Build dynamic web pages using JavaScript (client side programming).
- Write a well formed / valid XML documents.
- Understand Web server and its working also working with Ajax for asynchronous communication.

Course Outcomes: Students will be able to

CO-1	Design web pages with different elements and attributes.
CO-2	Build websites with dynamic functionality using java script.
CO-3	Identify the functionality of XML and create an XML document and display data from XML document.
CO-4	**CO 4:** Recognize the use of web servers and know the functionality of web servers

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1		2	2	1					1	2	3	2		2	
CO-2			1							1		3			
CO-3			1											2	
CO-4		2	3	2		1	2	1	2	2	3	3			

UNIT-1 — 15 Periods

Introduction to HTML5 Part I, Introduction to HTML5 Part II, Cascading Style Sheets I, Cascading Style SheetsII, **JavaScript:** Introduction to Scripting, Control Statements I, Control Statements II, Functions, Arrays.

UNIT-2 — 15 Periods

JavaScript: Objects, Dynamic HTML: Document Object Model and Collections, Event Model, HTML5Introduction to Canvas.

UNIT-3 — 15 Periods

XML: Introduction, XML Basics, Structuring data, XML Namespaces, DTD, XSD, XSL Transformations.

UNIT-4 — 15 Periods

Building Ajax-Enabled Web Applications, Web Servers (IIS and Apache), Working with JQuery.

Text Books :

1. Harvey M. Deitel and Paul J. Deitel, "Internet & World Wide Web How to Program", 5/e, PHI.
2. Kogent Learning Solutions Inc.,HTML5 Black Book: "Covers CSS3, Javascript, XML, XHTML, Ajax, PHPand Jquery".

References :

1. Jason Cranford Teague, "Visual Quick Start Guide CSS, DHTML & AJAX", 4e, Pearson Education.
2. Tom NerinoDoli smith, "JavaScript & AJAX for the web", Pearson Education 2007.
3. Joshua Elchorn, "Understanding AJAX", Prentice Hall 2006.

NON-CONVENTIONAL ENERGY SOURCES

Institutional Elective-II (Code: 18MEI03)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- To explain different methods of exploiting solar energy
- To familiarize students with the principles, components, and performance characteristics of energy conversion technologies, such as wind turbines, geothermal power plants
- To evaluate the energy from ocean, tidal and biomass
- To familiarize the techniques in power generation using fuel cells, biogas and MHD

Course Outcomes: Students will be able to

CO-1	Understand different methods of exploiting solar energy.
CO-2	Understand the principles and energy conversion from wind and geo thermal sources
CO-3	Gain knowledge in exploring the energy from ocean, tidal and bio-mass
CO-4	Understand the techniques in power generation using Fuel cells, bio gas and MHD.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3	1		3	3		2			3	3	3	2	2	1
CO-2	3	1		3	3		2			3	3	3	3	3	1
CO-3	3	1		3	3		2			3	3	3	3	3	2
CO-4	3	1		3	3		2			3	3	3	3	3	2

UNIT-1 — 15 Periods

Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits**Solar Energy:** Extra terrestrial solar radiation - terrestrial solar radiation –solar radiations on earth-measurement of solar radiations-solar constant-solar collectors-flat plate collectors-concentrating collectors-solar thermal conversion-solar thermal central receiver systems - photovoltaic energy conversion - solar cells- energy storagemethods-applications of solar energy.

UNIT-2 — 15 Periods

Wind energy: Availability of wind energy in India, site selection-Components of wind energy conversion systems-Classification of wind energy conversion systems-vertical axis and horizontal axis wind turbines-Performance characteristics-Betz criteria coefficient-applications of WECS-environmental aspects

Geo thermal Energy: Structure of earth's interior-geothermal sites-geothermal resources-Site selection for geothermal power plants-Principle of working-various types of geothermal power plants- applications.

UNIT-3 — 15 Periods

Ocean thermal energy conversion (OTEC): Principle of ocean thermal energy conversion-Open cycle andclosed cycle OTEC plants-Merits and demerits

Tidal Power: Tides and waves as sources of energy-fundamentals and use of tidal energy-limitations of tidalenergy conversion system

Bio mass: Availability of biomass and its conversion techniques-bio mass gasification-bio mass

resourcedevelopment in India.	
UNIT-4	15 Periods
Bio Gas: Bio gas production, aerobic and anaerobic bio conversion process-Properties of bio gas-classificationof biogas plants-advantages and disadvantages-bio gas applications **Fuel Cells:** Classification, Principle of working of various types of fuel cells, merits and demerits, future potentialof fuel cells. **Magneto-Hydrodynamics (MHD):** Principle of working of MHD Power plant, Classification, advantages anddisadvantages.	
Text Books :	1. H.P. Garg& Jai Prakash, Solar Energy: Fundamentals and Applications, Tata McGraw Hill,New Delhi. 2. Non-Conventional Energy Sources by G.D.Rai, Khanna Publisher. 3. B H Khan, "Non-Conventional Energy Resources", 2nd Edition, Tata McGraw HillEducation Pvt Ltd, 2011
References :	1. Power plant technology by EL-Wakil, McGraw-Hill. 2. Renewable Energy Sources by John Twidell& Toney Weir: E&F.N. Spon.

AUTOMOBILE ENGINEERING

Institutional Elective-II (Code: 18MEI04)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives: Students will be able to

- Familiarize the fundamentals of Engine Components, Chassis and suspension system, braking andtransmission system, and cooling and lubrication system.
- Develop a strong base for understanding future developments like hybrid and electric vehicles in theautomobile industry.

Course Outcomes: Students will be able to

CO-1	List different types of Vehicles and their applications
CO-2	Define working of Automobile Engine cooling and lubrication system.
CO-3	Describe functioning of Ignition system and its accessories.
CO-4	Describe functioning of Transmission, Steering, Braking and Suspension system.
CO-5	Understand the working and layout of Hybrid and electric vehicles and their components

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	1	2	2	1	1	2	2	1		1	1	2	1	1	1
CO-2	2	1	2	1		1		1		1	2	2	1		1
CO-3	1	2	2		2	2				2	1	3	1		1
CO-4	2	2	2	2		2		2			2	2	2	2	2

UNIT-1 — 15 Periods

INTRODUCTION: Classification of vehicles – applications, valves, valve arrangements and operating Mechanisms, Piston - design basis, types, piston rings, firing order; Crankshafts, Flywheel, Air and Fuel Filters,Mufflers.

FUEL SUPPLY SYSTEMS: Fuel supply pumps, Mechanical and Electrical type Diaphragm pumps.

COOLING SYSTEMS: Need for cooling system, Air and water cooling, Thermal syphon cooling systems.

UNIT-2 — 15 Periods

LUBRICATING SYSTEMS: Various lubricating systems for I.C. Engines.

ELECTRICAL SYSTEM: Ignition system, Spark plugs, Distributor, Electronic Ignition, Alternator, cut out, Current and voltage regulators, charging circuit, starting motors, lighting, instruments and accessories.

CHASSIS: Introduction, Construction, Requirements of Chassis.

UNIT-3 — 15 Periods

TRANSMISSION: Gear Box - Theory, Four speed and Five Speed Sliding Mesh, Constant mesh & synchromesh type, selector mechanism, automatic transmission, overdrive, propeller shaft, differential - principle of working.

SUSPENSION SYSTEMS: Need for suspension systems, springs, shock absorbers, axles – front and rear,different methods of floating rear axle, front axle and wheel alignment.

UNIT-4	15 Periods
VEHICLE CONTROL: Steering mechanisms and power steering, types of brakes and brake actuation mechanisms (air and hydraulic). **ELECTRIC, HYBRID AND FUEL CELL VEHICLES:** Layout of electric and hybrid vehicles – Advantages and drawbacks, System Components, Electronic control system, Different configurations of electric and hybrid vehicles hybrid vehicles, Power split device, High energy and power density batteries – Basics of fuel cell vehicles.	
Text Books :	1. Automobile Engineering - G.B.S.Narang. 2. Automobile Engineering - R.B.Gupta. 3. Automobile Engineering - Vol I & II - Kirpal Singh
References :	1. Automotive Mechanics - Joseph Heitner. 2. Automobile Engineering - S.Srinivasan.

GRAPH THEORY

Institutional Elective-II (Code: 18MAI02)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None

Course Objectives: Students will learn how to

- To apply the fundamental concepts of graph theory for determining Isomorphism of graphs and also solving the real life problems like Konigsberg Bridge Problem and travelling Salesman Problem.
- To analyze the concepts of Trees and Fundamental Circuits with their properties for finding Minimal Spanning Trees in weighted Graphs by using Kruskals and Prim's Algorithms.
- To acquire the ample knowledge of coloring of a graph and Planar graphs with their different representations for detecting the planarity of graphs by using Kurotowski's Theorem and also Computing the Chromatics number for a given graph including four color problem
- To get an idea of representation of graphs in matrices such as incidence matrix , Adjacency matrix etc and establishment of the correspondence between graph-theoretic properties and matrix properties.

Course Outcomes: After studying this course, the students will be able to

CO1	Discuss the basic concepts of graph theory and able to determine whether a graph is Eulerian and Hamiltonian.
CO2	Apply Kruskal's and Prim's algorithms in order to determine the minimum spanning tree in a connected weighted graph.
CO3	Determine the planarity of a graph using Kuratowski's algorithm and find the chromatic number of a given graph.
CO4	Analyse the properties of graphs through matrix representation and utilize these ideas in the application of switching network.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3									2		2	
CO2	3	3	3									2		2	
CO3	3	3	3									2		2	
CO4	3	3	3									2		2	

UNIT-1 15 Periods

PATHS AND CIRCUITS:

Introduction: Graphs: Graph, Finite and infinite graphs, Incidence and degree, isolated vertex, pendent vertex and null graph; Isomorphism; Subgraphs; walks, paths and circuits; Connected graphs, Disconnected graphs and Components; Euler graphs(Konigsberg Bridge Problem); Hamiltonian Paths and circuits; Travelling salesman problem.

[Sections: 1.1; 1.3; 1.4; 1.5; 2.1; 2.2; 2.4; 2.5; 2.6; 2.9; 2.10]

UNIT-2	15 Periods
TREES AND FUNDAMENTAL CIRCUITS: Trees; Some Properties of Trees; Distance and centers in a Tree; Rooted and Binary Trees; Spanning Trees; Fundamental circuits; Spanning Trees in a Weighted graphs(Kruskal's Algorithm and Prim's Algorithm). [Sections:3.1; 3.2; 3.4; 3.5; 3.7; 3.8; 3.10	
UNIT-3	15 Periods
PLANAR AND DUAL GRAPHS: Planar graphs; Kuratowski's two graphs; Different Representations of a Planar graph: Euler's formula, Theorem-5.6 and Corollary; Detection of planarity(Kuratowski's theorem); Geometric Dual; Coloring of a Graph, Chromatic number, The four Color problem. [Sections: 5.2; 5.3; 5.4; 5.5; 5.6; 8.1, 8.6]	
UNIT-4	15 Periods
MATRIX REPRESENTATION OF GRAPHS: Incidence Matrix; Submatrices of A(G); Circuit Matrix; Fundamental Circuit Matrix and Rank of B; Application to a switching network; Cut-set Matrix; Relationship among A_f, B_f and C_f; Path Matrix; Adjacency Matrix. [Sections:7.1; 7.2; 7.3; 7.4; 7.5; 7.6; 7.7; 7.8; 7.9]	
Text Books :	Narsingh Deo, 'Graph Theory with Applications to Engineering and Computer Science' Prentice-Hall of India Private Limited, New Delhi.
References :	Douglas B. West "Introduction to graph Theory" Pearson Education Private limited, Delhi, 2002.

ADVANCED MATERIALS
Institutional Elective-II (Code: 18PHI03)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None

Course Objectives: Students will be able

- To acquire knowledge on synthesis and properties of nano and bio materials
- To educate the student on characteristics and usage of composite and optical materials.
- To possess the knowledge on properties and applications of superconducting materials.
- To know the functionality of smart materials and their adoption in real time applications

Course Outcomes: After studying this course, the students will be able to

CO1	Understand the importance of nano-materials, their characteristics and applications.
CO2	Identify, describe and evaluate the properties of fibre reinforcements, polymer materials and optical materials.
CO3	Advance their knowledge in phenomenon of superconductivity and applications.
CO4	Explain the strengths and weaknesses of a smart material and surface acoustic wave materials into the design of a product in various applications.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3												2	-	-
CO-2	2	2											2	-	-
CO-3	2			2									2	-	-
CO-4	2	2											2	-	-

UNIT-1 — 15 Periods

Nano Materials: Origin of nano technology, Classification of nano materials, Physical, chemical, electrical, mechanical properties of nano materials. Preparation of nano materials by plasma arcing, physical vapour deposition, chemical vapour deposition (CVD), Sol-Gel, electro deposition, ball milling, carbon nano tubes(CNT).Synthesis, preparation of nanotubes, nano sensors, Quantum dots, nano wires,nano biology, nano medidcines.

Biomaterials: Overview of biomaterials. Biomaterials, bioceramics, biopolymers, tissue grafts, soft tissue applications, cardiovascular implants, biomaterials in ophthalmology, orthopeadiac implants, dental materials.

UNIT-2 — 15 Periods

Composites: General characteristics of composites , composites classes, PMCs, MMCs, CMCs, CCCs, IMCs, hybrid composites, fibers and matrices, different types of fibers, whiskers, different matrices materials, polymers, metal, ceramic matrices, toughening mechanism, interfaces, blending and adhesion, composite modeling, finite element analysis and design.

Optical materials: Mechanisms of optical absorption in metals, semiconductors and insulators. Non-linear optical materials, optical modulators and optical fibers. Display devices and materials photo-emissive, photovoltaic cells, charge coupled devices (CCD), laser materials.

UNIT-3	15 Periods

Super conducting materials: Types of super conductors, an account of mechanism of superconductors, effects of magnetic field currents, thermal energy, energy gap, acoustic attenuation, penetration depth, BCS theory, DC and AC Josephson effects, high Tc superconductors, potential applications of superconductivity, electrical switching element, superconductor power transmission and transformers, magnetic mirror, bearings, superconductor motors, generators, SQUIDS etc.

UNIT-4	15 Periods

Smart materials: An introduction, principles of smart materials, input – output decision ability, devices based on conductivity changes, devices based on changes in optical response, biological systems smart materials. Devices based on magnetization, artificial structures, surfaces, hetero structures, polycrystalline, amorphous, liquid crystalline materials.

Surface Acoustic Wave (SAW) Materials and Electrets: Delay lines, frequency filters, resonators, Pressure and temperature sensors, Sonar transducers. Comparison of electrets with permanent magnets, Preparation of electrets, Application of electrets.

Text Books :	1. B.S. Murthy et al., Textbook of Nano science and Nanotechnology, Universities press, Springer. 2. Krishan K Chawla, Composite Materials; Springer; 3rd ed. 2012.
References :	1. A.C. Rose-Innes and E.H. Rhoderick, *Introduction to Superconductivity*.2nd Edition 1978 2. Brian Culshaw, Smart structures and materials, Artech House Publishers

OPTOELECTRONIC DEVICES AND APPLICATIONS
Institutional Elective-II (Code: 18PHI04)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None

Course Objectives: Students will learn

- Understand the concepts of different lasers and mode locking systems.
- Gain the knowledge about light generating devices, solar cells and display devices.
- To know the operating mechanism and applications of various light detecting devices.
- To familiarize electro optic modulators relating to communication

Course Outcomes: The students will be able to

CO1	Develop the knowledge of laser operating principles and structures to produce giant optical pulses.
CO2	To Acquire the detailed knowledge about functionality and applications of solar cells, light generating and display devices
CO3	To possess the skills of design, develop and adoption of photo detectors in real time electronic applications.
CO4	To have the knowledge on the usage of optical modulators in communication process.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	3												2		
CO-2	2												2		
CO-3	2		2										2		
CO-4	2			2	2								2		

UNIT-1	15 Periods

Optical process in semiconductors /optical media: Interaction of photons with matter, radiative non radiative processes , rates of absorption and emission –laser principle optical feedback-threshold condition-semiconductor laser –heterojunction lasers quantum well lasers, tunneling based lasers, mode locking: active mode locking and passive mode locking Q-switching

UNIT-2	15 Periods

Display devices: photo luminescence, cathode luminescence, electro luminescence, injection luminescence, LED principle of operation- LED structure –frequency response –defects and reliability, plasma display liquid crystal display, numerical display-photovoltaic effect- I-V characteristics and spectral response of solar cells –heterojunction and cascaded solar cells-Schottky barrier and thin film solar cells –design of solar cell.

UNIT-3	15 Periods

Detection devices: photodetection principle, photo detector –thermal detector – photo conductor – noise in photo conductors –PIN photo diode –APD detector performance parameters –detectors for long wave length operation –wave length selective detection charge coupled device (CCD),

application of infrared detector used for TV and remote controllers		
UNIT-4		15 Periods
Communication –types of communication –examples –modulation-types of modulation – limitations of direct modulation – modulation by carrier injection in semiconductors – electro optic modulators – Kerr modulators Acousto- optic modulators (Bragg cell) , interferometric modulators semiconductor optical amplifiers .		
Text Books :	1. Pallab Bhattacharya "Semiconductor opto electronic devices" , Prentice Hall of India Pvt. LTD, New Delhi 2009 2. Jasptit Singh, "Opto Electronics-An introduction to Materials and Devices" ,Mc Graw-Hill International Edition,2014. 3. S.C.Gupta,"Opto Electronic Devices and Systems", Prentice Hall of India,2015 4. J.Wilson and J.F.B.Hawes,"Optoelectronics-An Introduction",Pearson Educatiob, Taiwan Ltd,2010.	
References :		

PROFESSIONAL COMMUNICATION

Institutional Elective-II (Code: 18ELI03)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 Hours	Final Exam Marks	:	50

Pre-Requisite:

Course Objectives: Students will be able to

- Improve grammar, mechanics and writing style for clarity, concision, coherence and emphasis and increase knowledge of technical communication
- Identify and understand the facets and functions of the primary genres of technical writing, reports, proposals and project reports
- Define and identify different life skills required in professional life
- Explain the basic mechanics of effective communication and demonstrate these through presentations.

Course Outcomes: Students will be able to

CO-1	Utilize writing skills in writing Technical reports, Project Proposals and make oral presentation of their findings
CO-2	Develop strategies for addressing multiple audiences, expert and lay audiences
CO-3	Apply principles of cross cultural etiquette and build professional network
CO-4	Demonstrate improved competency of Soft Skills required for the workplace

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO-1	-	-	-	-	-	-	2	2	3	3	3	2	2	2	-
CO-2	-	-	-	-	-	-	2	2	3	3	3	2	2	2	-
CO-3	-	-	-	-	-	-	0	2	3	3	3	2	2	2	-
CO-4	-	-	-	-	-	-	2	2	3	3	3	2	2	2	-

UNIT-1 — 15 Periods

Preparing project reports

Research methods- Abstract writing- background knowledge of the research topic-Literature review—Plagiarism- methodology- sampling- data collection and analysis- Integrate tables, figures, and other images into documents -presenting the findings- conclusion- preparing references- Appendices

UNIT-2 — 15 Periods

Oral presentation of the Projects (Viva voce)

Presentation and oral communication skills- presenting the findings of research- Maintaining audience orientation- body language- voice modulation- delivery of ideas

UNIT-3 — 15 Periods

Life skills for professionals

Understanding career management- Networking professionally- Mastering Cross Cultural Etiquette - Respecting social protocols- Developing a long term career plan- Making career choices

UNIT-4 — 15 Periods

Corporate Etiquette

Power Dressing – Greeting – Introduction - Polishing Business Manners (Hand Shakes, Gifts, Humour, Office Behaviour) – The art of Small talk & Conversations - Dining Etiquette

Text Books :

1. Training in Interpersonal Skills: Tips for Managing People at Work, Pearson Education, India; 6 edition, 2015.
2. The Ace of Soft Skills: Attitude, Communication and Etiquette for Success, Pearson Education; 1 edition, 2013.

	3. Markel, Mike, Technical Communication (9th Edition) Boston: Bedford/St. Martin's, 2009.
References :	1. Butterfield Jeff, "Soft Skills for Everyone", Cengage Learning India Pvt Ltd; 1 edition, 2011.