SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

INDUCTION PROGRAMME

S.No.	Course Name	Category	L-T-P-C
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counselling	MC	2-0-2-0
3	Orientation to All Branches -- Career Options, Tools, Etc.	MC	3-0-0-0
4	Orientation on Admitted Branch -- Corresponding Labs, Tools and Platforms	EC	2-0-3-0
5	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6	Assessment on Basic Aptitude and Mathematical Skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-1-2-0
8	Human Values & Professional Ethics	MC	3-0-0-0
9	Communication Skills -- Focus on Listening, Speaking, Reading, Writing Skills	BS	2-1-2-0
10	Concepts of Programming	ES	2-0-2-0

I B. Tech. – I Semester (CSIT)

S.No.	Course Code	Title	L	T	P	Credits
1	23HS0840	Engineering Physics	3	0	0	3
2	23HS0830	Linear Algebra & Calculus	3	0	0	3
3	23EE0201	Basic Electrical and Electronics Engineering	3	0	0	3
4	23ME0302	Engineering Graphics	1	0	4	3
5	23CS0501	Introduction to Programming	3	0	0	3
6	23CS0503	IT Workshop	0	0	2	1
7	23HS0841	Engineering Physics Lab	0	0	2	1
8	23EE0202	Electrical and Electronics Engineering Workshop	0	0	3	1.5
9	23CS0502	Computer Programming Lab	0	0	3	1.5
10	23HS0812	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Total			**13**	**-**	**15**	**20.5**

I B. Tech. – II Semester (CSIT)

S.No.	Course Code	Title	L	T	P	Credits
1	23HS0810	Communicative English	2	0	0	2
2	23HS0801	Chemistry	3	0	0	3
3	23HS0831	Differential Equations & Vector Calculus	3	0	0	3
4	23CE0101	Basic Civil & Mechanical Engineering	3	0	0	3
5	23CS0504	Data Structures	3	0	0	3
6	23HS0811	Communicative English Lab	0	0	2	1
7	23HS0802	Chemistry Lab	0	0	2	1
8	23ME0301	Engineering Workshop	0	0	3	1.5
9	23CS0505	Data Structures Lab	0	0	3	1.5
10	23HS0813	Health and wellness, Yoga and Sports	-	-	1	0.5
Total			**14**	**-**	**11**	**19.5**

II B. Tech. – I Semester (CSIT)

S.No.	Course Code	Title	L	T	P	Credits
1	23HS0836	Discrete Mathematics & Graph Theory	3	0	0	3
2	23HS0814	Universal Human Values - Understanding Harmony and Ethical human conduct	2	1	0	3
3	23CS0506	Digital Logic and Computer Organization	3	0	0	3
4	23CI0601	Data Structures & Algorithms	3	0	0	3
5	23CS0508	Object-Oriented Programming Through JAVA	3	0	0	3
6	23CI0602	Data Structures and Algorithms Lab	0	0	3	1.5
7	23CS0510	Object-Oriented Programming Through JAVA Lab	0	0	3	1.5
8	23CS0549	Python Programming	0	1	2	2
9	23HS0805	Environmental Science	2	0	0	0
Total			**16**	**2**	**8**	**20**

II B. Tech. – II Semester (CSIT)

S.No.	Course Code	Title	L	T	P	Credits
1	23HS0852	Optimization Techniques	2	0	0	2
2	23HS0838	Probability & Statistics	3	0	0	3
3	23CI0603	Principles of Operating Systems	3	0	0	3
4	23CS0512	Database Management Systems	3	0	0	3
5	23CS0513	Software Engineering	3	0	0	3
6	23CI0604	Principles of Operating Systems & Software Engineering Lab	0	0	3	1.5
7	23CS0515	Database Management Systems Lab	0	0	3	1.5
8	23CI0605	Python with DJango	0	1	2	2
9	23HS0815	Design Thinking &Innovation	1	0	2	2
Total			**15**	**1**	**10**	**21**
Mandatory Community Service Project / Internship of 08 weeks duration during summer vacation						

III B. Tech. – I Semester (CSIT)

S.No.	Course Code	Title	L	T	P	Credits
1	23CS0516	Artificial Intelligence	3	0	0	3
2	23CS0517	Computer Networks & Internet Protocols	3	0	0	3
3	23CS0518	Automata Theory and Compiler Design	3	0	0	3
4	23CS0519	Introduction to Quantum Technologies and Applications	3	0	0	3
Professional Elective course (PEC) –I						
5	23CS0532	Object Oriented Analysis and Design	3	0	0	3
	23CS0533	Soft Computing				
	23CI0606	Advanced Java				
	23EC0414	Microprocessors & Microcontrollers				
	23CS0534	Data Warehousing & Data Mining				
Open Elective (OE) –I						
6	23CE0150	Green Buildings	3	0	0	3
	23CE0151	Construction Technology and Management				
	23EE0261	Electrical Safety Practices and Standards				
	23ME0356	Sustainable Energy Technologies				
	23EC0406	Electronic Circuits				
	23CS0555	Quantum Technologies and Applications				
	23HS0855	Mathematics for Machine Learning and AI				
	23HS0842	Materials Characterization Techniques				
	23HS0806	Chemistry of Energy Systems				
	23HS0821	English for Competitive Examinations				
	23HS0822	Entrepreneurship and New Venture Creation				
7	23CS0520	Artificial Intelligence Lab	0	0	3	1.5
8	23CS0521	Computer Networks & Internet Protocols Lab	0	0	3	1.5
9	23CS0551	**Skill Enhancement Course**: Full Stack Development- II	0	1	2	2
10	23EC0417	Tinkering Lab	0	0	2	1
11	23CI0607	Evaluation of Community Service Internship	0	0	0	2
Total			**18**	**1**	**10**	**26**

III B. Tech. – II Semester (CSIT)

S.No.	Course Code	Title	L	T	P	Credits
1	23CS0523	Machine Learning	3	0	0	3
2	23CS0524	Cloud Computing	3	0	0	3
3	23CS0525	Cryptography & Network Security	3	0	0	3
Professional Elective course (PEC) –II						
4	23CS0535	Software Testing Methodologies	3	0	0	3
	23CS0536	Cyber Security				
	23CI0608	Extended Reality Systems				
	23CS0537	DevOps				
	23EC0451	Embedded Systems Design				
Professional Elective course (PEC) –III						
5	23CS0538	Software Project Management	3	0	0	3
	23CS0539	Mobile Adhoc Networks				
	23CS0540	Natural Language Processing				
	23CS0541	Distributed Operating System				
Open Elective (OE) –II						
6	23CE0152	Disaster Management	3	0	0	3
	23CE0153	Sustainability in Engineering Practices				
	23EE0262	Renewable Energy Sources				
	23ME0349	Automation and Robotics				
	23EC0441	Digital Electronics				
	23HS0858	Mathematical Foundation of Quantum Technologies				
	23HS0843	Physics of Electronic Materials and Devices				
	23HS0807	Chemistry of Polymers and Applications				
	23HS0823	Academic Writing and Public Speaking				
7	23CS0526	Machine Learning Lab	0	0	3	1.5
8	23CS0527	Cryptography & Network Security Lab	0	0	3	1.5
9	23HS0818	**Skill Enhancement Course:** Soft Skills	0	1	2	2
10	23HS0816	**Audit Course**: Technical Paper Writing & IPR	2	0	0	-
Total			**20**	**1**	**8**	**23**
Mandatory Industry Internship of 08 weeks duration during summer vacation						

IV B. Tech. – I Semester (CSIT)

S.No.	Course Code	Title	L	T	P	Credits
1	23CS0528	Deep Learning	3	0	0	3
2	23HS0861	Business Ethics and Corporate Governance	2	0	0	2
	23HS0862	E-Business				
	23HS0863	Management Science				
Professional Elective course (PEC) –IV						
3	23CS0542	Software Architecture & Design Patterns	3	0	0	3
	23CS0543	Block chain Technology				
	23CI0609	Generative AI				
	23CS0545	Internet of Things				
Professional Elective course (PEC) –V						
4	23CS0546	Agile Methodologies	3	0	0	3
	23CS0547	Metaverse				
	23CS0548	Computer Vision				
	23CS0559	Cyber Physical Systems				
Open Elective (OE) –III						
5	23CE0154	Building Materials and Services	3	0	0	3
	23CE0155	Environmental Impact Assessment				
	23EE0263	Smart Grid Technologies				
	23ME0357	3D Printing Technologies				
	23HS0856	Wavelet transforms and its applications				
	23HS0844	Smart Materials and Devices				
	23HS0846	Introduction to Quantum Mechanics				
	23HS0808	Green Chemistry and Catalysis for Sustainable Environment				
	23HS0824	Employability Skills				
Open Elective (OE) –IV						
6	23CE0156	Geo-Spatial Technologies	3	0	0	3
	23CE0157	Solid Waste Management				
	23EE0264	Electric Vehicles				
	23ME0351	Total Quality Management				
	23EC0442	Transducers and Sensors				
	23CS0557	Introduction to Quantum Computing				
	23HS0857	Financial Mathematics				
	23HS0845	Sensors and Actuators for Engineering Applications				
	23HS0809	Chemistry of Nanomaterials and Applications				
	23HS0825	Literary Vibes				
7	23CS0552	**Skill Enhancement Course**: Prompt Engineering	0	1	2	2
8	23HS0820	**Audit Course**: Gender Sensitization	2	0	0	-
9	23CI0610	Evaluation of Industry Internship	0	0	0	2
Total			**20**	**1**	**2**	**21**

IV B. Tech. – II Semester (CSIT)

S.No.	Course Code	Title	L	T	P	Credits
1	23CI0611	Internship	**0**	**0**	**0**	**4**
2	23CI0612	Project Work	**0**	**0**	**0**	**8**
Total						12

Note: L-Lecture hours, T-Tutorial, P-Practical, C-Credit

YEAR	I		II		III		IV		TOTAL
SEM	I	II	I	II	I	II	I	II	
CREDITS	20.5	19.5	20	21	26	23	21	12	163

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
List of Subjects

S.No.	Subject Code	Name of Subject
Core Subjects		
1	23CS0501	Introduction to Programming
2	23CS0502	Computer Programming Lab
3	23CS0503	IT Workshop
4	23CS0504	Data Structures
5	23CS0505	Data Structures Lab
6	23CS0506	Digital Logic and Computer Organization
7	23CI0601	Data Structures & Algorithms
8	23CS0508	Object-Oriented Programming Through JAVA
9	23CI0602	Data Structures and Algorithms Lab
10	23CS0510	Object-Oriented Programming Through JAVA Lab
11	23CS0549	Python Programming
12	23CI0603	Principles of Operating Systems
13	23CS0512	Database Management Systems
14	23CS0513	Software Engineering
15	23CI0604	Principles of Operating Systems & Software Engineering Lab
16	23CS0515	Database Management Systems Lab
17	23CI0605	Python with DJango
18	23CS0516	Artificial Intelligence
19	23CS0517	Computer Networks & Internet Protocols
20	23CS0518	Automata Theory and Compiler Design
21	23CS0519	Introduction To Quantum Technologies and Applications
22	23CS0520	Artificial Intelligence Lab
23	23CS0521	Computer Networks & Internet Protocols Lab
24	23CI0607	Evaluation of Community Service Internship
25	23CS0523	Machine Learning
26	23CS0524	Cloud Computing
27	23CS0525	Cryptography & Network Security
28	23CS0526	Machine Learning Lab
29	23CS0527	Cryptography & Network Security Lab
30	23CS0528	Deep Learning
31	23CI0610	Evaluation of Industry Internship

32	23CI0611	Internship
33	23CI0612	Project Work
Professional Elective Course (PEC)		
34	23CS0532	Object Oriented Analysis and Design
35	23CS0533	Soft Computing
36	23CI0606	Advanced Java
37	23EC0414	Microprocessors & Microcontrollers
38	23CS0534	Data Warehousing & Data Mining
39	23CS0535	Software Testing Methodologies
40	23CS0536	Cyber Security
41	23CI0608	Extended Reality Systems
42	23CS0537	DevOps
43	23EC0451	Embedded Systems Design
44	23CS0538	Software Project Management
45	23CS0539	Mobile Adhoc Networks
46	23CS0540	Natural Language Processing
47	23CS0541	Distributed Operating System
48	23CS0542	Software Architecture & Design Patterns
49	23CS0543	Block chain Technology
50	23CI0609	Generative AI
51	23CS0545	Internet of Things
52	23CS0546	Agile Methodologies
53	23CS0547	Metaverse
54	23CS0548	Computer Vision
55	23CS0559	Cyber Physical Systems
Skill Oriented Course/Skill Advanced Course/ Soft Skill Course		
56	23CS0549	Python Programming
57	23CI0605	Python with DJango
58	23CS0551	**Skill Enhancement Course**: Full Stack Development- II
59	23EC0417	Tinkering Lab
60	23HS0818	**Skill Enhancement course:** Soft skills
61	23CS0552	**Skill Enhancement Course**: Prompt Engineering
Open Electives from Other Departments		
62	23CE0150	Green Buildings
63	23CE0151	Construction Technology and Management

64	23EE0261	Electrical Safety Practices and Standards
65	23ME0356	Sustainable Energy Technologies
66	23EC0406	Electronic Circuits
67	23CS0555	Quantum Technologies And Applications
68	23HS0855	Mathematics for Machine Learning and AI
69	23HS0842	Materials Characterization Techniques
70	23HS0806	Chemistry of Energy Systems
71	23HS0821	English for Competitive Examinations
72	23HS0822	Entrepreneurship and New Venture Creation
73	23CE0152	Disaster Management
74	23CE0153	Sustainability in Engineering Practices
75	23EE0262	Renewable Energy Sources
76	23ME0349	Automation and Robotics
77	23EC0441	Digital Electronics
78	23HS0858	Mathematical Foundation of Quantum Technologies
79	23HS0843	Physics of Electronic Materials and Devices
80	23HS0807	Chemistry of Polymers and Applications
81	23HS0823	Academic Writing and Public Speaking
82	23CE0154	Building Materials and Services
83	23CE0155	Environmental Impact Assessment
84	23EE0263	Smart Grid Technologies
85	23ME0357	3D Printing Technologies
86	23HS0856	Wavelet transforms and its applications
87	23HS0844	Smart Materials and Devices
88	23HS0846	Introduction to Quantum Mechanics
89	23HS0808	Green Chemistry and Catalysis for Sustainable Environment
90	23HS0824	Employability Skills
91	23CE0156	Geo-Spatial Technologies
92	23CE0157	Solid Waste Management
93	23EE0264	Electric Vehicles
94	23ME0351	Total Quality Management
95	23EC0442	Transducers and Sensors
96	23CS0557	Introduction to Quantum Computing
97	23HS0857	Financial Mathematics
98	23HS0845	Sensors and Actuators for Engineering Applications

99	23HS0809	Chemistry of Nanomaterials and Applications
100	23HS0825	Literary Vibes
Subjects from Other Departments		
101	23HS0840	Engineering Physics
102	23HS0830	Linear Algebra & Calculus
103	23EE0201	Basic Electrical and Electronics Engineering
104	23ME0302	Engineering Graphics
105	23HS0841	Engineering Physics Lab
106	23EE0202	Electrical and Electronics Engineering Workshop
107	23HS0812	NSS/NCC/Scouts & Guides/Community Service
108	23HS0810	Communicative English
109	23HS0801	Chemistry
110	23HS0831	Differential Equations & Vector Calculus
111	23CE0101	Basic Civil & Mechanical Engineering
112	23HS0811	Communicative English Lab
113	23HS0802	Chemistry Lab
114	23ME0301	Engineering Workshop
115	23HS0813	Health and wellness, Yoga and Sports
116	23HS0836	Discrete Mathematics & Graph Theory
117	23HS0814	Universal Human Values - Understanding Harmony and Ethical human conduct
118	23HS0848	Managerial Economics and Financial Analysis
119	23HS0851	Organizational Behavior
120	23HS0850	Business Environment
121	23HS0838	Probability & Statistics
122	23HS0815	Design Thinking &Innovation
123	23EC0417	Tinkering Lab
124	23HS0861	Business Ethics and Corporate Governance
125	23HS0862	E-Business
126	23HS0863	Management Science
Non-Credit Courses		
127	23HS0805	Environmental Science
128	23HS0816	Technical Paper Writing & IPR
129	23HS0820	Gender Sensitization
Courses Offered for Honours Degree in CSIT		
130	23CS0557	Introduction to Quantum Computing

131	23CS0560	No SQL Databases
132	23CS0561	Software Defined Data Centre
133	23CS0562	Robotics and Intelligent Systems
134	23CS0563	Cloud Security
135	23CS0564	No SQL Lab
136	23CS0565	Quantum & Cloud Computing Lab

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I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(23HS0840) ENGINEERING PHYSICS
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Analyze the intensity variation of light due to polarization, interference and diffraction.*
2. *Familiarize with the basics of crystals and their structures.*
3. *Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.*
4. *Summarize various types of polarization of dielectrics and classify the magnetic materials.*
5. *Explain the basic concepts of Quantum Mechanics and the band theory of solids.*
6. *Identify the type of semiconductor using Hall effect.*

UNIT – I Wave Optics

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT II Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X- ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods.

UNIT III Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT IV Quantum Mechanics and Free electron Theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

UNIT V Semiconductors

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications

TEXTBOOKS

1. M. N. Avadhanulu, P.G.Kshirsagar & TVS ArunMurthy, *A Text book of Engineering Physics,* S. Chand Publications, 11th Edition 2019.
2. D.K.Bhattacharya and Poonam Tandon*, Engineering Physics,* Oxford press (2015).

REFERENCES

1. B.K. Pandey and S. Chaturvedi, *Engineering Physics,* Cengage Learning 2021.
2. Shatendra Sharma, Jyotsna Sharma, *Engineering Physics,* Pearson Education, 2018.
3. M.R. Srinivasan, *Engineering Physics,* New Age international publishers (2009).

Web Resources: https://www.loc.gov/rr/scitech/selected-internet/physics.html

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I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(23HS0830) LINEAR ALGEBRA & CALCULUS
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

COURSE OUTCOMES (COs)

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

1. *Develop and use of matrix algebra techniques that are needed by engineers for practical applications.*
2. *Identify different matrix techniques to find the inverse and powers of the matrix.*
3. *Understanding the concepts of continuity and differentiability of functions defined on intervals*
4. *Estimate the series expansions of algebraic and transcendental functions.*
5. *Analyze the functions of several variables which is useful in optimization.*
6. *Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.*

UNIT I

Matrices

Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

UNIT II

Eigen values, Eigenvectors and Orthogonal Transformation

Eigen values, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT III

Calculus

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

UNIT IV

Partial differentiation and Applications (Multi variable calculus)

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT V

Multiple Integrals (Multi variable Calculus)

Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXT BOOKS:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCES:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition(9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9th edition
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications,2014, Third Edition (Reprint 2021)

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I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(23EE0201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to all branches of Engineering)

COURSE OBJECTIVES
The objectives of this course

1. *To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.*
2. *This course provides the student with the fundamental skills to understand the principles of digital electronics, basics of semiconductor devices like diodes & transistors, characteristics and its applications.*

COURSE OUTCOMES (COs)
At the end of the course, the student will be able to

1. *Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.*
2. *Understand the problem-solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations*
3. *Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.*
4. *Demonstrate the characteristics by analyzing the behaviour of electronic devices.*
5. *Develop applications using electronic devices.*
6. *Understand the number systems, codes, Boolean algebra, logic gates, and functioning of logic circuits.*

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT II Machines and Measuring Instruments

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

UNIT III Energy Resources, Electricity Bill & Safety Measures

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of ―unit‖ used for consumption of electrical energy, two- part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

TEXTBOOKS:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

REFERENCES:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.

WEB RESOURCES:

1. https://nptel.ac.in/courses/108105053.
2. https://nptel.ac.in/courses/108108076.

PART B: BASIC ELECTRONICS ENGINEERING

UNIT I SEMICONDUCTOR DEVICES

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

TEXTBOOKS:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009.

REFERENCES:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009

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I B.Tech – I Sem.

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(23ME0302) ENGINEERING GRAPHICS
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is to

1. *Enable the students with various concepts like dimensioning, conventions and standards relate to Engineering Drawing*
2. *Impart knowledge on the projection of points, lines and plane surfaces.*
3. *Improve the visualization skills for better understanding of projection of solids.*
4. *Develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.*
5. *Make the students understand the viewing perception of a solid object in Isometric and Perspective projections.*

COURSE OUTCOMES (COs)

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

1. *Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.*
2. *Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.*
3. *Understand and draw projection of solids in various positions in first quadrant.*
4. *Elucidate the basic principles of sections of solids and true shapes*
5. *Explain principles behind development of surfaces.*
6. *Prepare isometric and perspective sections of simple solids.*

UNIT I

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods. Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves. Scales: Plain scales, diagonal scales and vernier scales.

UNIT II

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT III

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in **simple positions:** Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

UNIT IV

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

UNIT V

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).

TEXTBOOK:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

REFERENCES:

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc, 2009.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

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(23CS0501) INTRODUCTION TO PROGRAMMING
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

1. *To introduce students to the fundamentals of computer programming.*
2. *To provide hands-on experience with coding and debugging.*
3. *To foster logical thinking and problem-solving skills using programming.*
4. *To familiarize students with programming concepts such as data types, control structures, functions, and arrays.*
5. *To encourage collaborative learning and teamwork in coding projects.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Understand basics of computers, the concept of algorithm and algorithmic thinking.*
2. *Analyse a problem and develop an algorithm using control structures & arrays*
3. *Analyse a problem and develop an algorithm to solve it using strings*
4. *Understand and implement the problems using pointers*
5. *Apply modular approach for solving the problem*
6. *Design and implement problem-solving using structures, unions and files.*

UNIT - I

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting. Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT - II

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue.

UNIT - III

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

UNIT - IV

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

UNIT - V

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling.

Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS

1. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language, 2nd edition, 2015*.
2. Pradip Dey Manas Ghosh‖ Programming in C –First edition, Oxford University Press, 2018.

REFERENCES

1. Balagurusamy, E, *Computing fundamentals and C Programming*, McGraw-Hill Education, 2019.
2. Rema Theraja, *Programming in C*, Oxford, 2016, 2nd edition
3. Forouzan, Gilberg, Prasad, *C Programming, A Problem Solving Approach*, CENGAGE, 3rd edition

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(23CS0503) IT WORKSHOP
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

1. *To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables*
2. *To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS*
3. *To teach basic command line interface commands on Linux.*
4. *To teach the usage of Internet for productivity and self-paced life-long learning*
5. *To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Perform Hardware troubleshooting.*
2. *Understand Hardware components and inter dependencies.*
3. *Safeguard computer systems from viruses/worms.*
4. *Document/ Presentation preparation.*
5. *Perform calculations using spread sheets.*
6. *Understand and Analyse the concepts of Prompt Engineering, Language Translation and Creative Writing using AI Tools*

LIST OF EXPERIMENTS

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1: Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using La TeXand word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both La TeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spread sheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

POWER POINT

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI TOOLS – ChatGPT

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

REFERENCES

1. Vikas Gupta, *Comdex Information Technology course tool kit*, WILEY Dream tech, 2003.
2. Cheryl A Schmidt, *The Complete Computer upgrade and repair book*, WILEY Dream tech, 2013, 3rd edition

3. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. Kate J. Chase, *PC Hardware - A Handbook*, PHI (Microsoft)
5. Leslie Lamport, *LaTeX Companion*, PHI/Pearson.
6. David Anfins on and Ken Quamme, *IT Essentials PC Hardware and Software Companion Guide*, – CISCO Press, Pearson Education, 3rd edition
7. Patrick Regan, *IT Essentials PC Hardware and Software Labs and Study Guide*, CISCO Press, Pearson Education, 3rd edition.

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(23HS0841) ENGINEERING PHYSICS LAB
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Operate optical instruments like travelling microscope and spectrometer.*
2. *Estimate the wavelengths of different colours using diffraction grating.*
3. *Plot the intensity of the magnetic field of circular coil carrying current with distance.*
4. *Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.*
5. *Calculate the band gap of a given semiconductor*
6. *Identify the type of semiconductor using Hall Effect.*

LIST OF EXPERIMENTS

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using HallEffect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional

pendulum.

16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any **TEN** of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

REFERENCES

1. S. Balasubramanian, M.N. Srinivasan, *A Textbook of Practical Physics,* S. Chand Publishers, 2017.

Web Resources

1. www.vlab.co.in
2. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

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(23EE0202) ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP
(Common to all branches of Engineering)

Course Objectives:

To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

Course Outcomes:

1. *Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.* usage *of electronic measuring instruments.*
2. *Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.*
3. *Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.*
4. *Demonstrate knowledge of different electronic devices and measuring instruments.*
5. *Plot and discuss the characteristics and applications of various electron devices.*
6. *Verify the functions of logic gates and flip-flops.*

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that hardware tools and instruments are learned to be used by the students.

2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that measuring instruments are learned to be used by the students.

3. Components:
   - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
   - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART A: ELECTRICAL ENGINEERING LAB

List of experiments:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

Reference Books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Note: Minimum Six Experiments to be performed.

PART B: ELECTRONICS ENGINEERING LAB

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

References:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software

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(23CS0502) COMPUTER PROGRAMMING LAB
(Common to all branches of Engineering)

COURSE OBJECTIVES
The objectives of this course

1. *The course aims to give students hands – on experience and train them on the concepts of the C- programming language.*

COURSE OUTCOMES (COs)
1. *Read, understand, and trace the execution of programs written in C language.*
2. *Select the right control structure for solving the problem.*
3. *Develop C programs which utilize memory efficiently using programming constructs like pointers.*
4. *Develop Debug and Execute programs to demonstrate the applications of arrays in C.*
5. *Develop Debug and Execute programs to demonstrate the applications of functions in C.*
6. *Implement the C programs using File handling Concepts.*

UNIT I
WEEK 1 - Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

- **i)** Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- **ii)** Exposure to Turbo C, gcc
- **iii)** Writing simple programs using printf(), scanf()

WEEK 2 - Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments /Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 1: Converting algorithms/flow charts into C Source code. Developing the algorithms/flowcharts for the following sample programs

- **i)** Sum and average of 3 numbers
- **ii)** Conversion of Fahrenheit to Celsius and vice versa
- **iii)** Simple interest calculation

WEEK 3 - Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

- **i)** Finding the square root of a given number
- **ii)** Finding compound interest
- **iii)** Area of a triangle using heron's formulae
- **iv)** Distance travelled by an object

UNIT II

WEEK 4 - Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and the precedence and as associativity:

Lab 4: Simple computational problems using the operator' precedence and associativity

- **i)** Evaluate the following expressions. a. A+B*C+(D*E) + F*G b. A/B*C-B+A*D/3 c. A+++B---A d. J= (i++) + (++i)
- **ii)** Find the maximum of three numbers using conditional operator
- **iii)** Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5 - Objective: Explore the full scope of different variants of ―if construct‖ namely if-else, nullelse, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for ―if construct‖.

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures.

- **i)** Write a C program to find the max and min of four numbers using if-else.
- **ii)** Write a C program to generate electricity bill.
- **iii)** Find the roots of the quadratic equation.
- **iv)** Write a C program to simulate a calculator using switch case.
- **v)** Write a C program to find the given year is a leap year or not.

WEEK 6 - Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

- **i)** Find the factorial of given number using any loop.
- **ii)** Find the given number is a prime or not.
- **iii)** Compute sine and cos series
- **iv)** Checking a number palindrome
- **v)** Construct a pyramid of numbers.

UNIT III

WEEK 7 - Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7: 1D Array manipulation, linear search

- **i)** Find the min and max of a 1-D integer array.
- **ii)** Perform linear search on1D array.
- **iii)** The reverse of a 1D integer array
- **iv)** Find 2's complement of the given binary number.
- **v)** Eliminate duplicate elements in an array.

WEEK 8 - Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

- **i)** Addition of two matrices
- **ii)** Multiplication two matrices
- **iii)** Sort array elements using bubble sort
- **iv)** Concatenate two strings without built-in functions
- **v)** Reverse a string using built-in and without built-in string functions

UNIT IV

WEEK 9 - Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereferences.

- **i)** Write a C program to find the sum of a 1D array using malloc()
- **ii)** Write a C program to find the total, average of n students using structures
- **iii)** Enter n students data using calloc() and display failed students list
- **iv)** Read student name and marks from the command line and display the student details along with the total.
- **v)** Write a C program to implement realloc()

WEEK 10 - Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bit fields, Self-Referential Structures, Linked lists

Lab10: Bit fields, linked lists Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

- **i)** Create and display a singly linked list using self-referential structure.
- **ii)** Demonstrate the differences between structures and unions using a C program.
- **iii)** Write a C program to shift/rotate using bit fields.
- **iv)** Write a C program to copy one structure variable to another structure of the same type.

UNIT V

WEEK 11 - Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration.

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent.

Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem.

- **i)** Write a C function to calculate NCR value.
- **ii)** Write a C function to find the length of a string.
- **iii)** Write a C function to transpose of a matrix.
- **iv)** Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 12 - Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

- **i)** Write a recursive function to generate Fibonacci series.
- **ii)** Write a recursive function to find the LCM of two numbers.
- **iii)** Write a recursive function to find the factorial of a number.
- **iv)** Write a C Program to implement Ackermann function using recursion.
- **v)** Write a recursive function to find the sum of series.

WEEK 13 - Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

- **i)** Write a C program to swap two numbers using call by reference.
- **ii)** Demonstrate Dangling pointer problem using a C program.
- **iii)** Write a C program to copy one string into another using pointer.
- **iv)** Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK 14 - Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

- **ii)** Write a C program to write and read text into a file.
- **iii)** Write a C program to write and read text into a binary file using fread() and fwrite()
- **iv)** Copy the contents of one file to another file.
- **v)** Write a C program to merge two files into the third file using command-line arguments.
- **vi)** Find no. of lines, words and characters in a file
- **vii)** Write a C program to print last n characters of a given file.

TEXTBOOKS

1. Ajay Mittal, *Programming in C: A practical approach*, Pearson.
2. Byron Gottfried, *Schaum's Outline of Programming with C*, McGraw Hill

REFERENCES

1. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language*, PrenticeHall of India
2. Forouzan, Gilberg, Prasad, *C Programming, A Problem-Solving Approach,* CENGAGE

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I B.Tech – I Sem.

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(23HS0812) NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Understand the importance of discipline, character and service motto.*
2. *Solve some societal issues by applying acquired knowledge, facts, and techniques.*
3. *Explore human relationships by analyzing social problems.*
4. *Determine to extend their help for the fellow beings and downtrodden people.*
5. *Develop leadership skills and civic responsibilities.*
6. *Focus on awareness programmes that build community service*

UNIT I

Orientation

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
ii) Conducting orientations programs for the students –future plans-activities-releasing road map etc.
iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT II

Nature & Care

Activities:

i) Best out of waste competition.
ii) Poster and signs making competition to spread environmental awareness.
iii) Recycling and environmental pollution article writing competition.
iv) Organising Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms.
vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
vii) Write a summary on any book related to environmental issues.

UNIT III

Community Service

Activities:

i) Conducting One Day Special Camp in a village contacting village-area leaders-Survey in the village, identification of problems- helping them to solve via media-authorities-experts-etc.

ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,

iii) Conducting consumer Awareness. Explaining various legal provisions etc.

iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.

v) Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme*
Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)

2. *Red Book - National Cadet Corps* – Standing Instructions Vol I & II, DirectorateGeneral of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., ―Introduction to Environmental Engineering‖, McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. ―Introduction to Environmental Engineering and Science‖, Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totaling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject

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(23HS0810) COMMUNICATIVE ENGLISH
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Understand the context, topic, and pieces of specific information from social or Transactional dialogues.*
2. *Apply grammatical structures to formulate sentences and correct word forms.*
3. *Analyze discourse markers to speak clearly on a specific topic in informal discussions.*
4. *Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.*
5. *Create a coherent paragraph, essay, and resume.*
6. *Demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively.*

UNIT – I

Lesson: HUMAN VALUES: Gift of Magi **(Short Story)**

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT – II

Lesson: NATURE: The Brook by Alfred Tennyson (Poem)

Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Structure of a paragraph - Paragraph writing (specific topics)
Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary: Homonyms, Homophones, Homographs.

UNIT – III

Lesson: BIOGRAPHY: Elon Musk

Listening: Listening for global comprehension and summarizing what is listened to.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed
Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing: Summarizing, Note-making, paraphrasing
Grammar: Verbs - tenses; subject-verb agreement; Compound words,
Vocabulary: Collocations

UNIT – IV

Lesson: INSPIRATION: The Toys of Peace by Saki

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing: Letter Writing: Official Letters, Resumes.
Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice
Vocabulary: Words often confused, Jargons

UNIT – V

Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)
Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking: Formal oral presentations on topics from academic contexts
Reading: Reading comprehension.
Writing: Writing structured essays on specific topics.
Grammar: Editing short texts –identifying and correcting common errors in grammar andusage (articles, prepositions, tenses, subject verb agreement)
Vocabulary: Technical Jargons

TEXTBOOKS

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3).
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5).

REFERENCES

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020.
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge,2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge UniversityPress, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building aSuperior Vocabulary. Anchor, 2014.

WEB RESOURCES:

GRAMMAR:

1. www.bbc.co.uk/learningenglish.
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

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I B.Tech – II Sem.

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(23HS0801) CHEMISTRY
(Common to EEE, ECE, CSE, CSIT, CSM, CIC, CAD, CCC & CAI branches)

COURSE OBJECTIVES
The objectives of this course

1. *To familiarize engineering chemistry and its applications*
2. *To train the students on the principles and applications of electrochemistry and polymers*
3. *To introduce instrumental methods, molecular machines and switches.*

COURSE OUTCOMES (COs)
After the completion of the course student should be able to

1. *Acquire the knowledge on the behaviour and interactions between matter and energy at both the atomic and molecular levels.*
2. *Analyze and demonstrate the applications of modern engineering materials in real world.*
3. *Impart the knowledge on the essential aspects of electrochemical cells, emf and applications of emf measurements*
4. *Gain the knowledge about construction and applications of batteries and sensors,*
5. *Impart knowledge on the essential aspects of Principles and comprehend idea about the synthesis and engineering applications of polymers.*
6. *Analyse the molecular transitions of Electromagnetic radiation (EMR) with matter in various spectroscopic techniques.*

UNIT – I Structure and Bonding Models:
Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT- II Modern Engineering Materials
Semiconductors – Introduction, basic concept, application.
Super Conductors - Introduction basic concept, applications.
Super Capacitors - Introduction, Basic Concept, Classification – Applications.
Nano Materials - Introduction, classification, properties and applications of Fullerenes, Carbon nano tubes and Graphines nano particles.

UNIT- III Electrochemistry and Applications
Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples. Primary cells – Zinc-air battery, Secondary cells – lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygenfuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT - IV Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting Polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

UNIT - V Instrumental Methods and Applications

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. High pressure Liquid Chromatography (HPLC) Classification, Principle, Instrumentation and Applications.

TEXTBOOKS

1. Jain and Jain, *Engineering Chemistry*, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, *Atkins' Physical Chemistry*, 10/e,Oxford University Press, 2010.

REFERENCES

1. S koog and West, *Principles of Instrumental Analysis*, 6/e, Thomson, 2007.
2. J .D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Fred W. Billmayer Jr, Textbook of Polymer Science, 3rd Edition.

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I B.Tech – II Sem.

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(23HS0831) DIFFERENTIAL EQUATIONS & VECTOR CALCULUS
(Common to all branches of Engineering)

COURSE OBJECTIVES
The objectives of this course

1. *To enlighten the learners in the concept of differential equations and multivariable calculus.*
2. *To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.*

COURSE OUTCOMES (COs)
After the completion of the course student should be able to

1. *Solve the differential equations related to various engineering fields.*
2. *Create basic application problems described by second order linear differential equations with constant coefficients.*
3. *Understand basic properties of standard partial differential equations.*
4. *Identify solution methods for partial differential equations that model physical processes.*
5. *Interpret the physical meaning of different operators such as gradient, curl and divergence.*
6. *Estimate the work done against a field, circulation and flux using vector calculus.*

UNIT I
Differential equations of first order and first degree

Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

UNIT II
Linear differential equations of higher order (Constant Coefficients)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT III
Partial Differential Equations

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

UNIT IV

Vector differentiation

Scalar and vector point functions, vector operator Del, Del applies to scalar point functions-Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT V

Vector integration

LWithoutegral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

TEXTBOOKS:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCES:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018,5th Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017.

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I B.Tech – II Sem.

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(23CE0101) BASIC CIVIL & MECHANICAL ENGINEERING
(Common to all branches of Engineering)

PART A: BASIC CIVIL ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. *Get familiarized with the scope and importance of Civil Engineering sub-divisions.*
2. *Introduce the preliminary concepts of surveying.*
3. *Acquire preliminary knowledge on Transportation and its importance in nation's economy.*
4. *Get familiarized with the importance of quality, conveyance and storage of water*
5. *Introduction to basic civil engineering materials and construction techniques.*

COURSE OUTCOMES (COs)

After the completion of the course, student should be able to

1. *Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.*
2. *Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.*
3. *Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation and understand the process of water storage and its supply to the public.*

UNIT I

Basics of Civil Engineering: Role of Civil Engineers in Society - Various Disciplines of Civil Engineering - Structural Engineering - Geo-technical Engineering - Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering - Scope of each discipline - Building Construction and Planning - Construction Materials - Cement - Aggregate - Bricks - Cement concrete - Steel. Introduction to Prefabricated construction Techniques

UNIT II

Surveying: Objectives of Surveying - Horizontal Measurements - Angular Measurements - Introduction to Bearings - Levelling instruments used for levelling - Simple problems on levelling and bearings - Contour mapping.

UNIT III

Transportation Engineering: Importance of Transportation in Nation's economic development - Types of Highway Pavements - Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering

Water Resources and Environmental Engineering: Introduction, Sources of water - Quality of water - Specifications - Introduction to Hydrology – Rainwater Harvesting - Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

TEXT BOOKS

1. M.S.Palanisamy, *Basic Civil Engineering,* Tata McGraw Hill publications (India) Pvt. Ltd. Fourth Edition, 2011.
2. S.S. Bhavikatti, *Introduction to Civil Engineering,* New Age International Publishers, First Edition, 2022.
3. Satheesh Gopi, *Basic Civil Engineering*, Pearson Publications, First Edition, 2009

REFERENCES

1. S.K. Duggal, *Surveying, Vol- I and Vol-II,* Tata McGraw Hill Publishers, Fifth Edition, 2019
2. Santosh Kumar Garg, *Hydrology and Water Resources Engineering,* Khanna Publishers, Delhi, 2016
3. Santosh Kumar Garg, *Irrigation Engineering and Hydraulic Structures*, Khanna Publishers, Delhi, 38th Edition, 2023
4. S.K.Khanna, C.E.G. Justo and Veeraraghavan*, Highway Engineering*, Nemchand and Brothers Publications, 10th Edition, 2019
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

PART B: BASIC MECHANICAL ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. *Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.*
2. *Explain different engineering materials and different manufacturing processes.*
3. *Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.*

COURSE OUTCOMES

After the completion of the course, student should be able to

1. *Understand the role of mechanical engineering and materials in the manufacturing and automotive industries*
2. *Explain the basics of manufacturing processes and thermal engineering and its applications.*
3. *Describe the working of different power plants. Mechanical power transmission systems and the applications of robotics in industrial sector.*

UNIT I

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT II

Manufacturing Processes: Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT III

Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

TEXTBOOKS

1. V.Ganesan, *Internal Combustion Engines*, Tata McGraw Hill publications (India)Pvt. Ltd.
2. S.S. Rattan, *A Tear book of Theory of Machines* Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. Jonathan Wicker and Kemper Lewis, *An introduction to Mechanical Engineering,* Cengagelearning India Pvt. Ltd.

REFERENCE BOOKS

1. Appuu Kuttan KK, *Robotics*, I.K. International Publishing House Pvt. Ltd. Volume-I
2. L. Jyothish Kumar, Pulak M Pandey,*3D printing & Additive Manufacturing Technology*, Springer publications
3. Mahesh M Rathore, *Thermal Engineering*, Tata McGraw Hill publications (India) Pvt. Ltd.
4. G. Shanmugam and M.S.Palanisamy, *Basic Civil and the Mechanical Engineering*, TataMcGraw Hill publications (India) Pvt. Ltd.

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I B.Tech – II Sem.

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(23CS0504) DATA STRUCTURES
(Common to CSE, CSIT, CSM, CIC, CAD, CCC & CAI branches)

COURSE OBJECTIVES

1. *To provide the knowledge of basic data structures and their implementations.*
2. *To understand importance of data structures in context of writing efficient programs.*
3. *To develop skills to apply appropriate data structures in problem solving.*

COURSE OUTCOMES (COs)

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

1. *Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.*
2. *Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.*
3. *Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.*
4. *Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges.*
5. *Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.*
6. *Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.*

UNIT - I

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures.

Searching Techniques: Linear & Binary Search.

Sorting Techniques: Bubble sort, Selection sort, Insertion Sort

UNIT - II

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

UNIT III

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

UNIT IV

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.

UNIT V

Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal, AVL Trees

Graphs: Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Applications of graphs.

TEXTBOOKS

1. Mark Allen Weiss, *Data Structures and algorithm analysis in C*, Pearson, 2nd Edition.
2. Reema Thareja –Data Structures using C‖,Third Edition,Oxford University,2023

REFERENCES

1. Kurt Mehlhorn and Peter Sanders, *Algorithms and Data Structures: The Basic Toolbox,*
2. Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft, *C Data Structures and Algorithms.*
3. *intonation* Brad Miller and David Ranum, *Problem Solving with Algorithms and Data Structures*.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, *Introduction to Algorithms.,*
5. Robert Sedgewick, *Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms*

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(23HS0811) COMMUNICATIVE ENGLISH LAB
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Understand the different aspects of the English language proficiency with emphasis on LSRW skills.*
2. *Apply communication skills through various language learning activities.*
3. *Analyze the English speech sounds, stress, rhythm, and syllable division for better listening and speaking comprehension.*
4. *Evaluate and exhibit professionalism in participating in debates and group discussions.*
5. *Become active participants in the learning process and acquire proficiency in spoken English.*
6. *Speak with clarity and confidence thereby enhances employability skills.*

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Suggested Software:

1. Walden Infotech 2. Young India Films

REFERENCES:

1. Raman Meenakshi, Sangeeta-Sharma. *Technical Communication*. Oxford Press.2018.
2. Taylor Grant: *English Conversation Practice*, Tata McGraw-Hill Education India,2016
3. Hewing's, Martin. Cambridge *Academic English* (B2). CUP, 2012.
4. J. Sethi & P.V. Dhamija. A Course in Phonetics and Spoken English, (2nd Ed), Kindle, 2013.

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(23HS0802) CHEMISTRY LAB
(Common to EEE, ECE, CSE, CSIT, CSM, CIC, CAD, CCC & CAI branches)

COURSE OBJECTIVES
The objectives of this course

1. *Verify the fundamental concepts with experiments.*

COURSE OUTCOMES (COs)
After the completion of the course student should be able to

1. *Determine the cell constant and conductance of solutions.*
2. *Prepare advanced polymer Bakelite materials.*
3. *Measure the strength of an acid present in secondary batteries.*
4. *Analyse the IR spectra of some organic compounds.*
5. *Able to understand about the fundamental concepts of analytical instruments*
6. *Calculate strength of acid in Pb-Acid battery.*

LIST OF EXPERIMENTS
1. Measurement of 10Dq by spectro photometric method
2. Conduct ometric titration of strong acid vs. strong base
3. Conduct ometric titration of weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a Bakelite
8. Verify Lambert-Beer's law
9. Wavelength measurement of sample through UV-Visible Spectroscopy
10. Identification of simple organic compounds by IR
11. Preparation of nanomaterials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry

Note: Any Ten experiments may be conducted

REFERENCES

- J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar *"Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition"* Pearson Publications

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

I B.Tech – II Sem.

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(23ME0301) ENGINEERING WORKSHOP
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is to

1. *Familiarize with the different types of wood and carpentry joints.*
2. *Develop Tapered Tray and Conical funnel using sheet metal.*
3. *Acquire practical knowledge on different types of fittings.*
4. *Provides hands-on training in the trades of House-Wiring .*
5. *Overview of metal cutting processes, foundry, Welding and plumbing, is provided through live demonstrations.*
6. *Acquire practical skills by performing the experiments in different shops of workshop.*

COURSE OUTCOMES

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

1. *Describe the different types of wood and carpentry joints.*
2. *Produce Tapered Tray and Conical funnel using sheet metal.*
3. *Understands about Fitting and their types.*
4. *Explain the method of preparation of various House-Wiring .*
5. *Apply basic techniques in foundry, Welding and plumbing.*
6. *Estimate the amount of material required for various models.*

SYLLABUS

1. **Demonstration**: Safety practices and precautions to be observed in workshop.

2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.

a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.

a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre

5.**Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.

a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

TEXTBOOKS:

1. Felix W, *Basic Workshop Technology: Manufacturing Process*, Independently Published, 2019.
2. Bruce J. Black, *Workshop Processes, Practices and Materials*; Routledge publishers, 5th Edn. 2015.
3. B.S. Raghuwanshi*, A Course in Workshop Technology Vol I. & II*, Dhanpath Rai & Co., 2015 & 2017.

REFERENCES:

1. S. K. Hajra Choudhury & Others, *Elements of Workshop Technology, Vol. I* , Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. H. S. Bawa, Workshop Practice, Tata-McGraw Hill, 2004.
3. Soni P.M. & Upadhyay P.A., Wiring Estimating, Costing and Contracting; Atul Prakashan, 2021-22

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I B.Tech. – II Sem.

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(23CS0505) DATA STRUCTURES LAB
(Common to CSE, CSIT, CSM, CIC, CAD, CCC & CAI branches)

COURSE OBJECTIVES
The objectives of this course

1. *The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem.*
2. *It enables them to gain knowledge in practical applications of data structures.*

COURSE OUTCOMES (COs)
After the completion of the course student should be able to

1. *Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.*
2. *Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.*
3. *Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.*
4. *Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges.*
5. *Implement the concepts of Binary Search Trees in Linked List*
6. *Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.*

LIST OF EXPERIMENTS:

Exercise 1: Array Manipulation

i) Write a program to reverse an array.
ii) C Programs to implement the Searching Techniques – Linear & Binary Search
iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

Exercise 2: Linked List Implementation

i) Implement a singly linked list and perform insertion and deletion operations.
ii) Develop a program to reverse a linked list iteratively and recursively.
iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications

i) Create a program to detect and remove duplicates from a linked list.
ii) Implement a linked list to represent polynomials and perform addition.
iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation

i) Implement a doubly linked list and perform various operations to understand its properties and applications.
ii) Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations

i) Implement a stack using arrays and linked lists.
ii) Write a program to evaluate a postfix expression using a stack.
iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations

i) Implement a queue using arrays and linked lists.
ii) Develop a program to simulate a simple printer queue system.
iii) Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications

i) Use a stack to evaluate an infix expression and convert it to postfix.
ii) Create a program to determine whether a given string is a palindrome or not.
iii) Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Binary Search Tree

i) Implementing a BST using Linked List.
ii) Traversing of BST.

Exercise 9: Graph

i) Write a program for finding the Depth First Search of a graph.
ii) Write a program for finding the Breadth First Search of a graph.

TEXTBOOKS

1. Mark Allen Weiss, *Data Structures and algorithm analysis in C,* Pearson, 2nd Edition.
2. Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, *Fundamentals of data structures in C,* Silicon Press, 2008

REFERENCES

1. Kurt Mehlhorn and Peter Sanders, *Algorithms and Data Structures: The Basic Toolbox,*
2. Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft, *C Data Structures and Algorithms.*
3. Brad Miller and David Ranum, *Problem Solving with Algorithms and Data Structures*.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, *Introduction to Algorithms.,*
5. Robert Sedgewick, *Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms.*

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I B.Tech – II Sem.

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(23HS0813) HEALTH AND WELLNESS, YOGA AND SPORTS
(Common to all branches of Engineering)

COURSE OBJECTIVES

The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Understand the importance of yoga and sports for Physical fitness and sound health*
2. *Demonstrate an understanding of health-related fitness components.*
3. *Compare and contrast various activities that help enhance their health.*
4. *Assess current personal fitness levels.*
5. *Develop Positive Personality.*
6. *Apply various activities for holistic development.*

UNIT I

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index(BMI) of all age groups.

Activities:

i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) Preparation of chart for balance diet for all age groups

UNIT II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.

Practicing general and specific warm up, aerobics

ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

Reference Books:

1. Gordon Edlin, Eric Golanty. *Health and Wellness*, 14th Edn. Jones & Bartlett Learning,2022
2. T.K.V.Desikachar. *The Heart of Yoga: Developing a Personal Practice*
3. Archie J.Bahm. *Yoga Sutras of Patanjali*, Jain Publishing Company, 1993
4. Wiseman, John Lofty, *SAS Survival Handbook: The Ultimate Guide to SurvivingAnywhere*, Third Edition, William Morrow Paperbacks, 2014
5. *The Sports Rules Book/ Human Kinetics with Thomas Hanlon.* - 3rd ed. Human Kinetics, Inc.2014

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as manyas Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

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II B.Tech – I Sem.

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(23HS0836) DISCRETE MATHEMATICS & GRAPH THEORY
(Common to All Branches of Engineering)

COURSE OBJECTIVES
The objectives of this course

1. *To enable students to understand the fundamentals of set, relation and recurrence relation.*
2. *To enable students to understand the fundamental concepts of graph theory and its applications in computer science.*

COURSE OUTCOMES (COs)
At the end of the course, Student will be able to

1. *Apply mathematical logic to solve problems.*
2. *Understand the concepts and perform the operations related to sets, relations and functions. Gain the conceptual background needed and identify structures of algebraic nature.*
3. *Apply basic counting techniques to solve combinatorial problems.*
4. *Formulate problems and solve Binomial, Multinomial problems*
5. *Formulate problems and solve recurrence relations.*
6. *Apply Graph Theory in solving computer science problems*

UNIT - I
Mathematical Logic:

Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus.

UNIT - II
Set theory:

The Principle of Inclusion- Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.

UNIT III
Elementary Combinatorics:

Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.

UNIT IV

Recurrence Relations

Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots, Solutions of Inhomogeneous, Recurrence Relations.

UNIT V

Graphs

Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs.

TEXTBOOKS

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science,Tata McGrawHill,2002.
2. Kenneth H.Rosen, Discrete Mathematics and its Applications with Combinatorics and GraphTheory,7thEdition,McGraw Hill Education(India)Private Limited.

REFERENCES

1. *JoeL.Mott, Abraham Kandel and The odoreP.Baker, Discrete Mathematics for Computer Scientists & Mathematicians,2nd Edition, Pearson Education.*
2. *Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science.*

ONLINE LEARNING RESOURCES:

1. *http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf*

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II B.Tech – I Sem.

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(23HS0814) UNIVERSAL HUMAN VALUES UNDERSTANDING HARMONY& ETHICAL HUMAN CONDUCT

(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

1. *To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.*
2. *To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.*
3. *To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.*

COURSE OUTCOMES (COs)

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

1. *Define the terms like Natural Acceptance, Happiness and Prosperity*
2. *Identify oneself, and one's surroundings (family, society nature)*
3. *Apply what they have learnt to their own self in different day-to-day settings in real life*
4. *Relate human values with human relationship and human society.*
5. *Justify the need for universal human values and harmonious existence*
6. *Develop as socially and ecologically responsible engineers*

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions. The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT - I

Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself
Lecture 3: self-exploration as the Process for Value Education
Lecture4: Continuous Happiness and Prosperity – the Basic Human Aspirations
Tutorial 2: Practice Session PS2 Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT - II

Harmony in the Human Being (6 lectures and 3 tutorials for practice session)
Lecture 7: Understanding Human being as the Co-existence of the self and the body.
Lecture 8: Distinguishing between the Needs of the self and the body
Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.
Lecture 9: The body as an Instrument of the self
Lecture 10: Understanding Harmony in the self
Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self
Lecture 11: Harmony of the self with the body
Lecture 12: Programme to ensure self-regulation and Health
Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III

Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)
Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT IV

Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)
Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among
the Four Orders of Nature
Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence

UNIT V

Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values

Lecture 24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education

Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies

Lecture 28: Strategies for Transition towards Value-based Life and Profession

Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I – Introduction to Value Education

PS1 Sharing about Oneself

PS2 Exploring Human Consciousness

PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being

PS4 Exploring the difference of Needs of self and body

PS5 Exploring Sources of Imagination in the self

PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)

PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

TEXTBOOKS

1. R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

2. R R Gaur, R Asthana, G P Bagaria,Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

REFERENCES

1. *JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.*
2. *Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.*
3. *The Story of Stuff (Book).*
4. *The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi*
5. *Small is Beautiful - E. F Schumacher.*
6. *Slow is Beautiful - Cecile Andrews*
7. *Economy of Permanence - J C Kumarappa*
8. *Bharat Mein Angreji Raj – PanditSunderlal*
9. *Rediscovering India - by Dharampal*
10. *Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi*
11. *India Wins Freedom - Maulana Abdul Kalam Azad*
12. *Vivekananda - Romain Rolland (English)*
13. *Gandhi - Romain Rolland (English)*

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them. Tutorial hours are to be used for practice sessions. While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements. In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting. Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department. Teacher

preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

ONLINE LEARNING RESOURCES:

1. *https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf*
2. *https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf*
3. *https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf*
4. *https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf*
5. *https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf*
6. *https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-*
7. *S2A%20Und%20Nature-Existence.pdf*
8. *https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf*
9. *https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385*
10. *https://onlinecourses.swayam2.ac.in/aic22_ge23/preview*

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II B.Tech – I Sem.

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(23CS0506) DIGITAL LOGIC AND COMPUTER ORGANIZATION
(Common to All CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course

1. *Provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals*
2. *Describe memory hierarchy concepts*
3. *Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices*

COURSE OUTCOMES (COs)

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

1. *Differentiate between combinational and sequential circuits based on their characteristics and functionalities.*
2. *Demonstrate an understanding of computer functional units.*
3. *Analyze the design and operation of processors, including instruction execution, pipelining, and control unit mechanisms, to comprehend their role in computer systems.*
4. *Demonstrate Hardwired Control and Multi programmed Control Units*
5. *Describe memory hierarchy concepts, including cache memory, virtual memory, and secondary storage, and evaluate their impact on system performance and scalability.*
6. *Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices, including interrupts, DMA, and I/O mapping techniques.*

UNIT - I

Data Representation: Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes

Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers

UNIT - II

Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters

Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von- Neumann Architecture

UNIT III

Computer Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations

Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control

UNIT IV

The Memory Organization: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage

UNIT V

Input/ Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces

TEXTBOOKS

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 6th edition, McGraw Hill
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education.

REFERENCES

1. *Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.*
2. *Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson*
3. *Computer Organization and Design, David A. Paterson, John L.Hennessy, Elsevier*
4. *Fundamentals of Logic Design, Roth, 5thEdition, Thomson*

ONLINE LEARNING RESOURCES:

1. *https://nptel.ac.in/courses/106/103/106103068/*

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II B.Tech – I Sem.

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(23CI0601) DATA STRUCTURES & ALGORITHMS

COURSE OBJECTIVES

The objectives of this course

1. *provide knowledge on advance data structures frequently used in Computer Science domain*
2. *Develop skills in algorithm design techniques popularly used*
3. *Understand the use of various data structures in the algorithm design*

COURSE OUTCOMES (COs)

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

1. *Illustrate the working of the advanced tree data structures and their applications.*
2. *Understand the Graph data structure, traversals and apply them in various contexts.*
3. *Use various data structures in the design of algorithms.*
4. *Analyze the efficiency of Greedy and Dynamic Programming design techniques to solve the optimization problems.*
5. *Recommend appropriate data structures based on the problem being solved.*
6. *Analyze algorithms with respect to space and time complexities.*

UNIT - I

Introduction: Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations.

AVL Trees: Creation, Insertion, Deletion operations and Applications

B-Trees: Creation, Insertion, Deletion operations and Applications

UNIT - II

Heap Trees (Priority Queues): Min and Max Heaps, Operations and Applications

Graphs: Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications

Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen's matrix multiplication, Convex Hull

UNIT III

Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths

Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths– General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem

UNIT IV

Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem

Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem

UNIT V

NP Hard and NP Complete Problems: Basic Concepts, Cook's theorem

NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP)

NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling

TEXTBOOKS

1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh, 2ndEdition Universities Press
2. Computer Algorithms in C++, Ellis Horowitz, SartajSahni, Sanguthevar Rajasekaran, 2nd Edition University Press

REFERENCES

1. *Data Structures and program design in C, Robert Kruse, Pearson Education Asia*
2. *An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill*
3. *The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.*
4. *Data Structures using C & C++: Langsam, Augenstein&Tanenbaum, Pearson, 1995*
5. *Algorithms + Data Structures & Programs:, N.Wirth, PHI*
6. *Fundamentals of Data Structures in C++: Horowitz Sahni& Mehta, Galgottia Pub.*
7. *Data structures in Java:, Thomas Standish, Pearson Education Asia*

ONLINE LEARNING RESOURCES:

1. *https://www.tutorialspoint.com/advanced_data_structures/index.asp*
2. *http://peterindia.net/Algorithms.html*
3. *https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O*

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

II B.Tech – I Sem.

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(23CS0508) OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to All CSIT,CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course

1. *Identify Java language components and how they work together in applications*
2. *Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.*
3. *Learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications*
4. *Understand how to design applications with threads in Java*
5. *Understand how to use Java APIs for program development*

COURSE OUTCOMES (COs)

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

1. *Understand the Java language components for implementing control statements.*
2. *Apply the concepts of OOP's fundamentals like classes, Methods and class libraries to develop applications*
3. *Apply the concepts of arrays, inheritance develop efficient java applications.*
4. *Analyze the interfaces for implementing multiple inheritance.*
5. *Evaluate the concepts of packages, file I/O, by using access control, and exception handling mechanisms to solve real world scenarios*
6. *Create the GUI applications by using concepts like multi-threading, Java FX, JDBC*

UNIT - I

Object Oriented Programming: Basic concepts, Principles,

Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types, Variables, and Operators: Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

UNIT - II

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT III

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT IV

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.

Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java.

UNIT V

String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer.

Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface

Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events

TEXTBOOKS

1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2. Joy with JAVA, Fundamentals of Object Oriented Programming, DebasisSamanta, MonalisaSarma, Cambridge, 2023.
3. JAVA for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

REFERENCES

1. *The complete Reference Java, 11thedition, Herbert Schildt,TMH*
2. *Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson*

ONLINE LEARNING RESOURCES:

1. *https://nptel.ac.in/courses/106/105/106105191/*
2. *https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview*

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II B.Tech – I Sem.

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(23CI0602) DATA STRUCTURES & ALGORITHMS LAB

COURSE OBJECTIVES

The objectives of this course

1. *acquire practical skills in constructing and managing Data structures*
2. *apply the popular algorithm design methods in problem-solving scenarios*

COURSE OUTCOMES (COs)

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

1. *Design and develop programs to solve real world problems with the popular algorithm design methods.*
2. *Demonstrate an understanding of Non-Linear data structures by developing implementing the operations on AVL Trees, B-Trees, Heaps and Graphs.*
3. *Relate the mathematical criterion for deciding whether an algorithm is efficient, and know many practically important problems that do not admit any efficient algorithms.*
4. *Critically assess the design choices and implementation strategies of algorithms and data structures in complex applications.*
5. *Utilize appropriate data structures and algorithms to optimize solutions for specific computational problems.*
6. *Compare the performance of different of algorithm design strategies*

Experiments covering the Topics:

- Operations on AVL trees, B-Trees, Heap Trees
- Graph Traversals
- Sorting techniques
- Finding Biconnected components in a graph
- Shortest path algorithms using greedy Method
- 0/1 Knapsack Problem using Dynamic Programming and Backtracking
- Travelling Salesperson problem using Branch and Bound
- N-Queens Problem using Backtracking
- Job Sequencing using Branch and Bound

Sample Programs:

1. Construct an AVL tree for a given set of elements which are stored in a file. And implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.
2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.
3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.
4. Implement BFT and DFT for given graph, when graph is represented by
   a) Adjacency Matrix b) Adjacency Lists
5. Write a program for finding the biconnected components in a given graph.
6. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).
7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.
8. Implement Job Sequencing with deadlines using Greedy strategy.
9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
10. Implement N-Queens Problem Using Backtracking.
11. Use Backtracking strategy to solve 0/1 Knapsack problem.
12. Implement Travelling Sales Person problem using Branch and Bound approach.

REFERENCES

1. *Fundamentals of Data Structures in C++, Horowitz Ellis, SahniSartaj, Mehta, Dinesh, 2ndEdition, Universities Press*
2. *Computer Algorithms/C++ Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, 2ndEdition, University Press*
3. *Data Structures and program design in C, Robert Kruse, Pearson Education Asia*
4. *An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill*

ONLINE LEARNING RESOURCES:

1. *http://cse01-iiith.vlabs.ac.in/*
2. *http://peterindia.net/Algorithms.html*

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II B.Tech – I Sem.

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(23CS0510) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB
(Common to All CSIT,CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course

1. *Practice object-oriented programming in the Java programming language*
2. *Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism*
3. *Illustrate inheritance, Exception handling mechanism, JDBC connectivity*
4. *Construct Threads, Event Handling, implement packages, Java FX GUI*

COURSE OUTCOMES (COs)

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

1. *Demonstrate a solid understanding of Java syntax, including data types, control structures, methods, classes, objects, inheritance, polymorphism, and exception handling.*
2. *Apply fundamental OOP principles such as encapsulation, inheritance, polymorphism, and abstraction to solve programming problems effectively.*
3. *Familiar with commonly used Java libraries and APIs, including the Collections Framework, Java I/O, JDBC, and other utility classes.*
4. *Identify and fix defects and common security issues in code.*
5. *Develop problem-solving skills and algorithmic thinking, applying OOP concepts to design efficient solutions to various programming challenges.*
6. *Proficiently construct graphical user interface (GUI) applications using JavaFX*

Experiments covering the Topics:

- Object Oriented Programming fundamentals- data types, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, JavaFX GUI

Sample Programs:

Exercise – 1:

a) Write a JAVA program to display default value of all primitive data type of JAVA

b) Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

Exercise - 2

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b) Write a JAVA program to sort for an element in a given list of elements using bubble sort

c) Write a JAVA program using String Buffer to delete, remove character.

Exercise - 3

a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.

b) Write a JAVA program implement method overloading.

c) Write a JAVA program to implement constructor.

d) Write a JAVA program to implement constructor overloading.

Exercise - 4

a) Write a JAVA program to implement Single Inheritance

b) Write a JAVA program to implement multi level Inheritance

c) Write a JAVA program for abstract class to find areas of different shapes

Exercise - 5

a) Write a JAVA program give example for "super" keyword.

b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

c) Write a JAVA program that implements Runtime polymorphism

Exercise - 6

a) Write a JAVA program that describes exception handling mechanism

b) Write a JAVA program Illustrating Multiple catch clauses

c) Write a JAVA program for creation of Java Built-in Exceptions

d) Write a JAVA program for creation of User Defined Exception

Exercise - 7

a) Write a JAVA program that creates threads by extending Thread class.First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds,(Repeat the same by implementing Runnable)

b) Write a program illustrating is Alive and join ()

c) Write a Program illustrating Daemon Threads.

d) Write a JAVA program Producer Consumer Problem

Exercise – 8

a) Write a JAVA program that import and use the user defined packages

b) Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX)

c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

REFERENCES

1. *P. J. Deitel, H. M. Deitel, "Java for Programmers", Pearson Education, PHI, 4th Edition, 2007.*
2. *P. Radha Krishna, "Object Oriented Programming through Java", Universities Press, 2nd Edition, 2007*
3. *Bruce Eckel, "Thinking in Java", Pearson Education, 4th Edition, 2006.*
4. *Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Oxford University Press, 5th Edition, 2010.*

ONLINE LEARNING RESOURCES:

1. *https://java-iitd.vlabs.ac.in/*
2. *http://peterindia.net/JavaFiles.html*

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II B.Tech – I Sem.

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(23CS0549) PYTHON PROGRAMMING
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

1. *Introduce core programming concepts of Python programming language.*
2. *Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries*
3. *Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these*

COURSE OUTCOMES (COs)

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

1. *Showcase adept command of Python syntax, deftly utilizing variables, data types, control structures, functions, modules, and exception handling to engineer robust and efficient code solutions.*
2. *Apply Python programming concepts to solve a variety of computational problems*
3. *Understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs*
4. *Acquire the skills in different operators and statements in python*
5. *Become proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas*
6. *Exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries*

UNIT - I

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.

4. Demonstrate the following Operators in Python with suitable examples.

i) Arithmetic Operators ii) Relational Operators iii) Assignment Operatorsiv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operatorsviii) Identity Operators

5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

UNIT - II

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

7. Write a program to define a function with multiple return values.
8. Write a program to define a function using default arguments.
9. Write a program to find the length of the string without using any library functions.
10. Write a program to check if the substring is present in a given string or not.
11. Write a program to perform the given operations on a list:

i. addition ii. Insertion iii. slicing

12. Write a program to perform any 5 built-in functions by taking any list.

UNIT III

Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.

Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

Sample Experiments:

13. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
14. Write a program to count the number of vowels in a string (No control flow allowed).
15. Write a program to check if a given key exists in a dictionary or not.
16. Write a program to add a new key-value pair to an existing dictionary.
17. Write a program to sum all the items in a given dictionary.

UNIT IV

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:

18. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
19. Python program to print each line of a file in reverse order.
20. Python program to compute the number of characters, words and lines in a file.
21. Write a program to create, display, append, insert and reverse the order of the items in the array.
22. Write a program to add, transpose and multiply two matrices.
23. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

UNIT V

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

24. Python program to check whether a JSON string contains complex object or not.
25. Python Program to demonstrate NumPy arrays creation using array () function.
26. Python program to demonstrate use of ndim, shape, size, dtype.
27. Python program to demonstrate basic slicing, integer and Boolean indexing.
28. Python program to find min, max, sum, cumulative sum of array
29. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:

a) Apply head () function to the pandas data frame

b) Perform various data selection operations on Data Frame

30. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

REFERENCES

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2ndEdition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

ONLINE LEARNING RESOURCES:

1. *https://www.coursera.org/learn/python-for-applied-data-science-ai*
2. *https://www.coursera.org/learn/python?specialization=python#syllabus*

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II B.Tech – I Sem.

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(23HS0805) ENVIRONMENTAL SCIENCE
(Common to All Branches of Engineering)

COURSE OBJECTIVES
The objectives of this course

1. *To make the students to get awareness on environment.*
2. *To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life.*
3. *To save earth from the inventions by the engineers.*

COURSE OUTCOMES (COs)
At the end of the course, Student will be able to

1. *To make the students to get awareness about the environment.*
2. *To understand the importance of protecting natural ecosystems for future.*
3. *To understand the various types of pollutions and its causes.*
4. *To understand the various engineering techniques to protect the environment.*
5. *To make awareness about social issues and laws of environmental protection.*
6. *To understand the concept of sustainable development and role of engineering Technology in environment and human health.*

UNIT - I
Multidisciplinary Nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources.

UNIT - II
Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.

b. Grassland ecosystem

c. Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Introduction, Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to **biodiversity**: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of :

a. Air Pollution.

b. Water pollution

c. Soil pollution

d. Marine pollution

e. Noise pollution

f. Thermal pollution

g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies.

Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/ mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

TEXTBOOKS

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education
3. S. Azeem Unnisa, "Environmental Studies" Academic Publishing Company
4. K. Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

REFERENCES

1. *Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.*
2. *M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.*
3. *J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.*
4. *J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited*
5. *G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House*
6. *Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited*

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II B.Tech – II Sem.

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(23HS0852) OPTIMIZATION TECHNIQUES

COURSE OBJECTIVES

The objectives of this course

1. *To provide the basic knowledge about Optimization, importance, application areas of in the industry, Linear Programming.*
2. *To impart different optimization models under typical situations in the business organization like transportation, assignment.*
3. *To understand the process of sequencing in a typical industry.*
4. *To describe different game strategies under cut-throat competitive business environment*
5. *To develop networks of activities of projects and to find out optimal modes of completing projects using network modelling evaluation techniques.*

COURSE OUTCOMES (COs)

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

1. *Understanding Optimization and Formulation of Linear Programing Models*
2. *Formulate and Solve Transportation & Assignment Models*
3. *Sequencing of operations and optimizing*
4. *Develop the knowledge on to decrease idle time and elapsed time*
5. *Discuss the game theory and strategies*
6. *Developing networks of activities and finding optimal mode of projects evaluation.*

UNIT - I

Introduction: Meaning, Nature, Scope & Significance of Optimization - Typical applications. The Linear Programming Problem – Introduction, Formulation of Linear Programming problem, Limitations of L.P.P, Graphical method, Simplex method: Maximization and Minimization model (exclude Duality problems), Big-M method and Two-Phase method.

UNIT - II

Transportation Problem: Introduction, Transportation Model, finding initial basic feasible solutions, Moving towards optimality, Unbalanced Transportation problems, Transportation problems with maximization, Degeneracy.

Assignment Problem – Introduction, Mathematical formulation of the problem, Solution of an Assignment problem, Hungarian Algorithm, Multiple Solution, Unbalanced Assignment problems, Maximization in Assignment Model.

UNIT III

Sequencing: Job sequencing, Johnsons Algorithm for n Jobs and Two machines, n Jobs and

Three Machines, n jobs through m machines, Two jobs and m Machines Problems.

UNIT IV

Game Theory: Concepts, Definitions and Terminology, Two Person Zero Sum Games, Pure Strategy Games (with Saddle Point), Principal of Dominance, Mixed Strategy Games (Game without Saddle Point), Significance of Game Theory in Managerial Application.

UNIT V

Project Management: Network Analysis – Definition –objectives -Rules for constructing network diagram- Determining Critical Path – Earliest & Latest Times – Floats - Application of CPM and PERT techniques in Project Planning and Control – PERT Vs CPM. (exclude Project Crashing).

TEXTBOOKS

1. R.Pannerselvam, *Operations Research,* PHI Publications.
2. S.D.Sharma-Kedarnath, *Operations Research*,
3. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, *Operations Research*, Pearson Education.
4. *Engineering Optimization: Theory and practice*, S.S.Rao, New Age International (P) Limited

REFERENCES

1. ND Vohra, *Quantitative Techniques in Management*, Tata McGraw Hill, 4th Edition, 2011.
2. Hiller & Libermann, *Introduction to O.R,* (TMH).
3. Maurice Saseini, ArhurYaspan& Lawrence Friedman, *Operations Research: Methods & Problems*, Pearson
4. Barry Render, Ralph M. Stair, Jr and Michael E. Hanna, *Quantitative Analysis For Management*
5. Wagner, *Operations Research*, PHI Publications.

ONLINE LEARNING SOURCES

1. https://onlinecourses.swayam2.ac.in/cec20_ma10/preview
2. https://onlinecourses.nptel.ac.in/noc20_ma23/preview
3. https://onlinecourses.nptel.ac.in/noc19_ma29/preview

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II B.Tech – II Sem.

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(23HS0838) PROBABILITY & STATISTICS
(Common to All Branches of Engineering)

COURSE OBJECTIVES
The objectives of this course

1. *To familiarize the students with the foundations of probability and statistical methods.*
2. *To help the students in getting a thorough understanding of fundamentals of probability and usage of statistical techniques like testing of hypothesis.*

COURSE OUTCOMES (COs)
At the end of the course, Student will be able to

1. *Acquire knowledge in finding the analysis of categorically and various statistical elementary tools*
2. *Develop skills in designing mathematical models involving probability, random variables and the critical thinking in the theory of probability and its applications in real life problems.*
3. *Apply binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies*
4. *Interpret the properties of normal distributions and its applications.*
5. *Analyze to test various hypotheses included in theory and types of errors for large samples.*
6. *Apply the different testing tools like t-test, F-test, chi-square test to analyze the relevant real life problems*

UNIT - I
Descriptive statistics

Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Measures of Central tendency, Measures of Variability (spread or variance) Skewness, Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, method of least squares, regression lines.

UNIT - II
Probability

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

UNIT III
Probability distributions

Probability distributions: Binomial, Poisson and Normal-their properties (Chebyshevs inequality). Approximation of the binomial distribution to normal distribution.

UNIT IV

Estimation and Testing of hypothesis, large sample tests

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

UNIT V

Small sample tests

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

TEXTBOOKS

1. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand &; Sons Publications, 2012.

REFERENCES

1. *S. Ross, a First Course in Probability, Pearson Education India, 2002.*
2. *W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.*
3. *B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.*

ONLINE LEARNING RESOURCES:

4. *https://onlinecourses.nptel.ac.in/noc21_ma74/preview*
5. *https://onlinecourses.nptel.ac.in/noc22_mg31/preview*

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(23CI0603) PRINCIPLES OF OPERATING SYSTEMS

COURSE OBJECTIVES

The objectives of this course

1. *Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection*
2. *Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.*
3. *Illustrate different conditions for deadlock and their possible solutions.*

COURSE OUTCOMES (COs)

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

1. *Describe the basics of the operating systems, mechanisms of OS to handle processes, threads, and their communication.*
2. *Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection.*
3. *Analyze the requirement for process synchronization and deadlocks handled by operating system.*
4. *Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.*
5. *Illustrate different conditions for deadlock and their possible solutions.*
6. *Analyze the memory management and its allocation policies.*

UNIT - I

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open-Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Building and Booting an Operating System, Operating system debugging

UNIT - II

Processes: Process Concept, Process scheduling, Operations on processes, Inter-process communication.

Threads and Concurrency: Multithreading models, Thread libraries, Threading issues.

CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.

UNIT III

Synchronization Tools: The Critical Section Problem, Peterson's Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization.

Deadlocks: system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

UNIT IV

Memory-Management Strategies: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping.

Virtual Memory Management: Introduction, Demand paging, Copy-on-write, Page replacement, Allocation of frames, Thrashing

Storage Management: Overview of Mass Storage Structure, HDD Scheduling.

UNIT V

File System: File System Interface: File concept, Access methods, Directory Structure; File **system Implementation:** File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing.

Protection: Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix.

TEXTBOOKS

1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson , 2016

REFERENCES

1. *Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018*
2. *Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013*

ONLINE LEARNING RESOURCES:

1. *https://nptel.ac.in/courses/106/106/106106144/*
2. *http://peterindia.net/OperatingSystems.html*

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(23CS0512) DATABASE MANAGEMENT SYSTEMS
(Common to All CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course

1. *Introduce database management systems and to give a good formal foundation on the relational model of data and usage of Relational Algebra*
2. *Introduce the concepts of basic SQL as a universal Database language*
3. *Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization*
4. *Provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques*

COURSE OUTCOMES (COs)

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

1. *Understand the basic concepts of database management systems*
2. *Analyze a given database application scenario to use ER model for conceptual design of the database*
3. *Develop relational algebra expressions to query and optimize the database using SQL*
4. *Utilize SQL proficiently to address diverse query challenges*
5. *Employ normalization methods to enhance database structure*
6. *Assess and implement transaction processing, concurrency control and database recovery protocols in databases.*

UNIT - I

Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

UNIT - II

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus. BASIC SQL:Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

UNIT III

SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

UNIT IV

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependencyLossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form(BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).

UNIT V

Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

Introduction to Indexing Techniques: B+ Trees, operations on B+Trees, Hash Based Indexing.

TEXTBOOKS

1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2. Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan,TMH (For Chapter 1 and Chapter 5)

REFERENCES

3. *Data Structures and program design in C, Robert Kruse, Pearson Education Asia*
4. *An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill*
5. *The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.*
6. *Data Structures using C & C++: Langsam, Augenstein&Tanenbaum, Pearson, 1995*
7. *Algorithms + Data Structures & Programs:, N.Wirth, PHI*
8. *Fundamentals of Data Structures in C++: Horowitz Sahni& Mehta, Galgottia Pub.*
9. *Data structures in Java:, Thomas Standish, Pearson Education Asia*
10. *Introduction to Database Systems, 8thedition, C J Date, Pearson.*
11. *Database Management System, 6th edition, RamezElmasri, Shamkant B. Navathe, Pearson*

12. *Database Principles Fundamentals of Design Implementation and Management, 10th edition, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 2022*

ONLINE LEARNING RESOURCES:

1. *https://nptel.ac.in/courses/106/105/106105175/*
2. *https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012758066672820 22456_shared/overview*

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(23CS0513) SOFTWARE ENGINEERING
(Common to All CSIT, CSE & CSE Allied branches)

COURSE OBJECTIVES
The objectives of this course

1. *Software life cycle models, Software requirements and SRS document.*
2. *Project Planning, quality control and ensuring good quality software.*
3. *Software Testing strategies, use of CASE tools, Implementation issues, validation & verification procedures.*

COURSE OUTCOMES (COs)
At the end of the course, Student will be able to

1. *Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance*
2. *Analyze various software engineering models and apply methods for design and development of software projects.*
3. *Illustrate the design process and architectural design*
4. *Develop system designs using appropriate techniques.*
5. *Understand various testing techniques for a software project.*
6. *Apply standards, CASE tools and techniques for engineering software projects.*

UNIT - I
Introduction: Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering.

Software Life Cycle Models: Basic concepts, Waterfall model and its extensions, Rapid application development, Agile development model, Spiral model.

UNIT - II
Software Project Management: Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management.

Requirements Analysis And Specification: Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL.

UNIT III
Software Design: Overview of the design process, How to characterize a good software design? Layered arrangement of modules, Cohesion and Coupling. approaches to software design.

Agility: Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process (Text Book 2)

Function-Oriented Software Design: Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review.

User Interface Design: Characteristics of a good user interface, Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interface design methodology.

UNIT IV

Coding And Testing: Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing, Testing object-oriented programs, Smoke testing, and Some general issues associated with testing.

Software Reliability And Quality Management: Software reliability. Statistical testing, Software quality, Software quality management system, ISO 9000. SEI Capability maturity model. Few other important quality standards, and Six Sigma.

UNIT V

Computer-Aided Software Engineering (Case): CASE and its scope, CASE environment, CASE support in the software life cycle, other characteristics of CASE tools, Towards second generation CASE Tool, and Architecture of a CASE Environment.

Software Maintenance: Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost.

Software Reuse: reuse- definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.

TEXTBOOKS

1. Fundamentals of Software Engineering, Rajib Mall, 5th Edition,PHI.
2. Software Engineering A practitioner's Approach, Roger S. Pressman, 9th Edition, Mc-Graw Hill International Edition.

REFERENCES

1. *Software Engineering, Ian Sommerville,10th Edition, Pearson.*
2. *Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.*

ONLINE LEARNING RESOURCES:

1. *https://nptel.ac.in/courses/106/105/106105182/*
2. *https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012605895063871 48827_shared/overview*
3. *https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003 904735_shared/overview*

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(23CI0604) PRINCIPLES OF OPERATING SYSTEMS & SOFTWARE ENGINEERING LAB

COURSE OBJECTIVES

The objectives of this course

1. *Provide insights into system calls, file systems, semaphores,*
2. *Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread implementation*
3. *Implement Bankers Algorithms to Avoid the Dead Lock*

COURSE OUTCOMES (COs)

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

1. *Trace different CPU Scheduling algorithms.*
2. *Implement Bankers Algorithms to Avoid the Dead Lock.*
3. *Describe the benefits of thread over process and implement synchronized programs using multithreading concepts*
4. *Evaluate Page replacement algorithms.*
5. *Illustrate the file organization techniques.*
6. *Illustrate Inter process Communication and concurrent execution of threads.*

Experiments covering the Topics:

- UNIX fundamentals, commands & system calls
- CPU Scheduling algorithms, thread processing
- IPC, semaphores, monitors, deadlocks
- Page replacement algorithms, file allocation strategies
- Memory allocation strategies

Sample Experiments:

1. Practicing of Basic UNIX Commands.
2. Write programs using the following UNIX operating system calls
   fork, exec, getpid, exit, wait, close, stat, opendir and readdir
3. Simulate UNIX commands like cp, ls, grep, etc.,
4. Simulate the following CPU scheduling algorithms
   a) FCFS b) SJF c) Priority d) Round Robin
5. Control the number of ports opened by the operating system with
   a) Semaphore b) Monitors.

6. Write a program to illustrate concurrent execution of threads using pthreads library.
7. Write a program to solve producer-consumer problem using Semaphores.
8. Implement the following memory allocation methods for fixed partition
   a) First fit b) Worst fit c) Best fit
9. Simulate the following page replacement algorithms
   a) FIFO b) LRU c) LFU
10. Simulate Paging Technique of memory management.
11. Implement Bankers Algorithm for Dead Lock avoidance and prevention
12. Simulate the following file allocation strategies
    a) Sequential b) Indexed c) Linked

Sample Experiments in Software Engineering:

1) Perform the following, for the following experiments:
   i. Do the Requirement Analysis and Prepare SRS
   ii. Draw E-R diagrams, DFD, CFD and structured charts for the project.
      a. Course Registration System
      b. Students Marks Analyzing System
      c. Online Ticket Reservation System
      d. Stock Maintenance
2) Consider any application, using COCOMO model, estimate the effort.
3) Consider any application, Calculate effort using FP oriented estimation model.
4) Draw the UML Diagrams for the problem a, b, c, d.
5) Design the test cases for e-Commerce application (Flipcart, Amazon)
6) Design the test cases for a Mobile Application (Consider any example from Appstore)
7) Design and Implement ATM system through UML Diagrams.

REFERENCES

1. *Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.*
2. *Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson, 2016*
3. 3. *K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International,2005*
4. 4. *Pankaj Jalote, "An Integrated Approach to Software Engineering", Second Edition, Springer.*
5. *5. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press*

ONLINE LEARNING RESOURCES:

1. *https://www.cse.iitb.ac.in/~mythili/os/*
2. *http://peterindia.net/OperatingSystems.html*

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(23CS0515) DATABASE MANAGEMENT SYSTEMS LAB
(Common to All CSIT, CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course

1. *Populate and query a database using SQL DDL/DML Commands*
2. *Declare and enforce integrity constraints on a database*
3. *Writing Queries using advanced concepts of SQL*
4. *Programming PL/SQL including procedures, functions, cursors and triggers*

COURSE OUTCOMES (COs)

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

1. *Utilizing Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) commands effectively within a database environment*
2. *Constructing and execute queries to manipulate and retrieve data from databases.*
3. *Develop application programs using PL/SQL.*
4. *Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system.*
5. *Analyze requirements and design custom Procedures, Functions, Cursors, and Triggers, leveraging their capabilities to automate tasks and optimize database functionality*
6. *Establish database connectivity through JDBC (Java Database Connectivity)*

Experiments covering the topics:

- DDL, DML, DCL commands
- Queries, nested queries, built-in functions,
- PL/SQL programming- control structures
- Procedures, Functions, Cursors, Triggers,
- Database connectivity- ODBC/JDBC

Sample Experiments:

1. Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.

3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

4. 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)

5.

i. Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)

ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE-APPLICATION ERROR.

8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

10. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

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

12. Create a table and perform the search operation on table using indexing and non-indexing techniques.

13. Write a Java program that connects to a database using JDBC

14. Write a Java program to connect to a database using JDBC and insert values into it

15. Write a Java program to connect to a database using JDBC and delete values from it

REFERENCES

1. *Oracle: The Complete Reference by Oracle Press*
2. *Nilesh Shah, "Database Systems Using Oracle", PHI, 2007*
3. *Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007*
4. *RamezElmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013.*
5. *Database Principles Fundamentals of Design Implementation and Management, 10th edition, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 2022*

ONLINE LEARNING RESOURCES:

1. *http://www.scoopworld.in*
2. *http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php*

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(23CI0605) PYTHON WITH DJANGO

COURSE OBJECTIVES:

The main objectives of the course are to

1. *Design and build static as well as dynamic web pages and interactive web-based applications*
2. *Web development using Django framework.*
3. *Analyze and create functional website in Django and deploy Django Web Application on Cloud*

UNIT-I:

Python libraries for web development:

Collections-Container datatypes, Tkinter-GUI applications, Requests-HTTP requests, BeautifulSoup4- web scraping, Scrapy, Zappa, Dash, CherryPy, Turbo Gears, Flask, Web2Py, Bottle, Falcon, Cubic Web, Quixote, Pyramid.

Sample Experiments:

1. Write a Python GUI program to import Tkinter package and create a window. Set its title and add a label to the window.
2. Write a Python program that designs a simple login form with labels and Entry widgets, arranging them in a grid using the Grid geometry manager.
3. Write a program using BeautifulSoup4 library for web scraping for a given URL
4. Develop a sample Hello World page using Flask framework
5. Develop a sample web page using CherryPy / Web2Py / Bottle Framework

UNIT-II: Introduction to Django Framework

Understanding Django environment, Features of Django and Django architecture, MVC and MTV, Urls and Views, Mapping the views to URLs, Django Template, Template inheritance Django Models, Creating model for site, Converting the model into a table, Fields in Models, Integrating Bootstrap into Django, Creating tables, Creating grids, Creating carousels.

Sample Experiments:

1. Create a Sample “Hello World” Application using Django
2. Create a Login and Registration Page using MVC architecture in Django Framework
3. Create a sample page in Django by integrating BootStrap.
4. Create an application with Tables, grids in Django
5. Create a Django App with Carousels feature**.**

UNIT-III: Integrating Accounts & Authentication on Django

Introduction to Django Authentication System, Security Problem &Solution with Django Creating Registration Form using Django, Adding Email Field in Forms, Configuring email settings, Sending emails with Django, Adding Grid Layout On Registration Page, Adding Page Restrictions, Login Functionality Test and Logout.

Sample Experiments:

1. Create a registration page using Authentication System
2. Create an application in Django to send emails using email settings and Grid Layout
3. Create an application in Django using page restriction / authentication with Login and Logout Functionality
4. Create a sample form using Django Forms

UNIT-IV: Connecting SQLite with Django

Database Migrations, Fetch Data from Database, Displaying Data on Templates, Adding Condition On Data, Sending data from url to view, Sending data from view to template, Saving objects into database, Sorting objects, Filtering objects, Deleting objects, Difference between session and cookie, Creating sessions and cookies in Django.

Sample Experiments:

1. Create an app in Django which fetches data from database and show as list and also save objects in database
2. Create an app in Django for performing CRUD operations on records in a database
3. Create an app in Django which uses session management and cookies to store and manage user sessions.

UNIT-V: Deploying Django Web Application on Cloud

Creating a functional website in Django, Four Important Pillars to Deploy, registering on Heroku and GitHub, Push project from Local System to GitHub, working with Django Heroku, Working with StaticRoot, Handling WSGI with gunicorn, setting up Database & adding users.

Sample Experiments:

1. Create a website in Django with login, and registration page.
2. Register on GitHub, and Heroku and deploy the website on Heroku with all the functionalities developed.
3. Configure Django to handle static files.

Text books:

1. *Martin C.Brown, "Python: The Complete Reference Paper back", 4th Edition 2018, McGraw Hill Education.*
2. *Reema Thareja, "Python Programming: Using Problem Solving Approach", 3rd Edition 2017, Oxford.*
3. *Daniel Rubio, Apress, "Beginning Django Web Application Development and Deployment with Python", 2nd Edition 2017,Apress.*

Reference Books:

1. *Tom Aratyn, "Building Django 2.0 Web Applications: Create enterprise-grade, scalable Python web applications easily with Django 2.0",2ndEdition 2018, Packt Publishing.*
2. *Harry Percival, "Test-Driven Development with Python: Obey the Testing Goat: Using Django, Selenium and JavaScript",2nd Edition 2019, Kindle Edition***.**

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(23HS0815) DESIGN THINKING FOR INNOVATION
(Common to All Engineering Branches)

COURSE OBJECTIVES

The objectives of this course

1. *Is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.*

COURSE OUTCOMES (COs)

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

1. *Define the concepts related to design thinking.*
2. *Explain the fundamentals of Design Thinking and innovation*
3. *Apply the design thinking techniques for solving problems in various sectors.*
4. *Analyze to work in a multidisciplinary environment*
5. *Evaluate the value of creativity*
6. *Formulate specific problem statements of real time issues*

UNIT - I

Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT - II

Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT III

Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to

innovation, Debate on value-based innovation.

UNIT IV

Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies

Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT V

Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes.

Activity: How to market our own product, About maintenance, Reliability and plan for startup.

TEXTBOOKS

1. Tim Brown, Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

REFERENCES

1. *David Lee, Design Thinking in the Classroom, Ulysses press*
2. *Shrutin N Shetty, Design the Future, Norton Press*
3. *William Lidwell, Universal Principles of Design- Kritinaholden, Jill Butter.*
4. *Chesbrough.H, The Era of Open Innovation – 2013*

ONLINE LEARNING RESOURCES:

1. *https://nptel.ac.in/courses/110/106/110106124/*
2. *https://nptel.ac.in/courses/109/104/109104109/*
3. *https://swayam.gov.in/nd1_noc19_mg60/previe*

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

II B.Tech – II Sem.

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

(Common to All Engineering Branches)

COMMUNITY SERVICE PROJECT

……Experiential learning through community engagement

- *Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.*
- *Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.*
- *Community Service Project is meant to link the community with the college for mutual benefit. The community will benefit with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and emerge as asocially responsible institution.*

Objective

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

1. *To sensitize the students to the living conditions of the people who are around them,*
2. *To help students to realize the stark realities of society.*
3. *To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability*
4. *To make students aware of their inner strength and help them to find new /out of box solutions to social problems.*
5. *To make students socially responsible citizens who are sensitive to the needs of thedisadvantaged sections.*
6. *To help students to initiate developmental activities in the community in coordination with public and government authorities.*
7. *To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.*

Implementation of Community Service Project

- Every student should put in 6 weeks for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.
- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, housewives, etc
- A logbook must be maintained by each of the students, where the activities undertaken/involved to be recorded.
- The logbook has to be countersigned by the concerned mentor/faculty in charge.
- An evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
- The final evaluation to be reflected in the grade memo of the student.
- The Community Service Project should be different from the regular programs ofNSS/NCC/Green Corps/Red Ribbon Club, etc.
- Minor project reports should be submitted by each student. An internal Viva shall alsobe conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ on thejob training.

Procedure

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a twofold one –
    - First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
    - Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
        - Agriculture
        - Health
        - Marketing and Cooperation
        - Animal Husbandry
        - Horticulture
        - Fisheries
        - Sericulture
        - Revenue and Survey
        - Natural Disaster Management

- Irrigation
- Law & Order
- Excise and Prohibition
- Mines and Geology
- Energy
- Internet
- Free Electricity
- Drinking Water

EXPECTED OUTCOMES

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

Learning Outcomes

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development.
- Improved ability to understand complexity and ambiguity

Personal Outcomes

- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills.

Social Outcomes

- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

Career Development

- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity.

Relationship with the Institution

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research.

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES ANDUNIVERSITIES

- Improved institutional commitment.

- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals.
- New energy, enthusiasm and perspectives applied to community work.
- Enhanced community-university relations.

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICEPROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expected to carry out these projects with involvement, commitment, responsibility, and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting should be ensured.

For Engineering Students

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming

26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling lvel- observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs

Programs for School Children

1. Reading Skill Program (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Program on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Program on Socially

relevant themes Programs for Women Empowerment

1. Government Guidelines and Policy Guidelines
2. Women's Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social

EntrepreneurshipGeneral Camps

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programs on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days.

Programs for Youth Empowerment

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality

Development Common Programs

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programs in consonance with the Govt. Departments like –
    i. Agriculture
    ii. Health
    iii. Marketing and Cooperation
    iv. Animal Husbandry
    v. Horticulture
    vi. Fisheries
    vii. Sericulture
    viii. Revenue and Survey
    ix. Natural Disaster Management
    x. Irrigation
    xi. Law & Order
    xii. Excise and Prohibition
    xiii. Mines and Geology
    xiv. Energy

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. Thestudents then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with theGovernmental agencies. As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also, with the Governmental Departments. If the program is rolled out, theDistrict Administration could be roped in for the successful deployment of the program.
- An in-house training and induction program could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity
Duration: 8 weeks

1. **Preliminary Survey (One Week)**
    - A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.

- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secreteriats could be aligned for the survey.

2. Community Awareness Campaigns (One Week)

- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmesto be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Three Weeks)

Along with the Community Awareness Programmes, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily logbook needs to be maintained by the student's batch, which should be countersigned by the governmental agency representative and the teacher- mentor, who is required to periodically visit the students and guide them.

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III B.Tech - I Sem.

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(23CS0516) ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

This course is designed to

1. *The student should be made to study the concepts of Artificial Intelligence.*
2. *The student should be made to learn the methods of solving problems using Artificial Intelligence.*
3. *The student should be made to introduce the concepts of Expert Systems.*
4. *To understand the applications of AI, namely game playing, theorem proving, and machine learning.*
5. *To learn different knowledge representation techniques*

COURSE OUTCOMES

After completion of the course, students will be able to

1. *Describe AI foundations, agent architectures, and environment types.*
2. *Apply search strategies to solve classical and complex problems.*
3. *Represent knowledge using logic and implement basic inference and planning.*
4. *Understand reinforcement learning and natural language applications.*
5. *Explain the principles of robotics and vision, and discuss AI ethics*
6. *Design and evaluate a small AI-driven project or application*

UNIT - I

Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

UNIT - II

Searching- Searching for solutions, uniformed search strategies,Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A*, AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

UNIT - III

Representation of Knowledge: Knowledge representation issues, predicate logic- logic

programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of probability, Bayes‘ probabilistic interferences and dempstershafer theory.

UNIT - IV

Logic concepts: First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.

UNIT - V

Expert Systems: Architecture of expert systems, Roles of expert systems,Knowledge Acquisition Meta knowledge Heuristics. Typical expert systems,MYCIN, DART, XCON: Expert systems shells.

TEXT BOOKS:

1. S. Russel and P. Norvig, *Artificial Intelligence,A Modern Approach*, Second Edition, Pearson Education.
2. Kevin Knight, Elaine Rich, and Nair B., *Artificial Intelligence (SIE)*, McGraw Hill.

REFERENCE BOOKS:

1. David Poole, Alan Mackworth, and Randy Goebel, *Computational Intelligence: A Logical Approach*, Oxford University Press.
2. G. Luger, *Artificial Intelligence: Structures and Strategies for Complex Problem Solving*, Fourth Edition, Pearson Education.
3. J. Nilsson, *Artificial Intelligence: A New Synthesis*, Elsevier Publishers.
4. Saroj Kaushik, *Artificial Intelligence*, CENGAGE Learning.

ONLINE LEARNING RESOURCES:

1. https://ai.google/
2. https://swayam.gov.in/nd1_noc19_me71/preview

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(23CS0517) COMPUTER NETWORKS & INTERNET PROTOCOLS
(Common to CSE, CAD, CCC)

COURSE OBJECTIVES

The course is designed to

1. *Understand the basic concepts of Computer Networks.*
2. *Introduce the layered approach for design of computer networks*
3. *Expose the network protocols used in Internet environment*
4. *Explain the format of headers of IP, TCP and UDP*
5. *Familiarize with the applications of Internet*
6. *Elucidate the design issues for a computer network*

COURSE OUTCOMES

After completion of the course students will be able to

1. *Identify the software and hardware components of a computer network*
2. *Design software for a computer network*
3. *Develop error, routing, and congestion control algorithms*
4. *Assess critically the existing routing protocols*
5. *Explain the functionality of each layer of a computer network*
6. *Choose the appropriate transport protocol based on the application requirements*

UNIT - I

Computer Networks and the Internet

What Is the Internet? Network Edge, The Network Core, Delay, Loss, and Throughput in Packet Switched Networks (Textbook 2), Reference Models, Multimedia Networks, Guided Transmission Media, Wireless Transmission (Textbook 1)

UNIT - II

The Data Link Layer, Access Networks, and LANs

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding window protocol(Textbook 1) Introduction to the Link Layer, Error Detection and Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page (Packet) (Textbook 2)

UNIT - III

The Network Layer:

Routing Algorithms, Internetworking, The Network Layer in The Internet (Textbook 1

UNIT - IV

The Transport Layer:

Connectionless Transport: UDP (Textbook 2), The Internet Transport Protocols: TCP, Congestion Control (Textbook 1)

UNIT - V

The Application Layer:

Principles of Network Applications, The Web and HTTP, Electronic Mail in the Internet, DNS—The Internet‘s Directory Service, Peer-to-Peer Applications, Video Streaming and Content Distribution Networks (Textbook 2)

TEXT BOOKS

1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks*, 5th Edition, Pearson.
2. James F. Kurose, Keith W. Ross, Computer Networking: A Top-Down Approach, 6th Edition, Pearson, 2019.

REFERENCES

1. Forouzan, Data Communications and Networking, 5th Edition, McGraw Hill Publication.
2. Youlu Zheng, Shakil Akhtar, Networks for Computer Scientists and Engineers, Oxford Publishers, 2016

ONLINE LEARNING RESOURSES

1. https://nptel.ac.in/courses/106101092
2. https://inl.info.ucl.ac.be/CNP3

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III B.Tech - I Sem.

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(23CS0518) AUTOMATA THEORY AND COMPILER DESIGN

COURSE OBJECTIVES

The course is designed to

1. *Able to understand the concept of abstract machines, construct FA, Regular Expressions for the regular languages and equivalent FSMs.*
2. *Able to construct pushdown automata equivalent to Context free Grammars, construct Turing Machines and understand undecidability.*
3. *Emphasize the concepts learnt in phases of compiler, lexical analyser and Top-down parser.*
4. *Able to understand the concepts of Bottom-up parser, Intermediate Code Generation.*
5. *Able to understand the concepts of Code optimizer and Code Generation.*

COURSE OUTCOMES

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

1. *Demonstrate knowledge on Automata Theory, Regular Expression and Analyze and Design of finite automata, and prove equivalence of various finite automata.*
2. *Demonstrate knowledge on context free grammar, Analyze and design of PDA and TM.*
3. *Understand the fundamental concepts and structure of compiler design, including its role in program translation.*
4. *Analyze the different phases of a compiler and apply this knowledge to construct lexical and syntax analyzers using tools like LEX and YACC*
5. *Ability to implement semantic rules into a parser that performs attribution while parsing and apply error detection and correction methods.*
6. *Apply the code optimization techniques to improve the space and time complexity of programs while programming and ability to design a compiler.*

UNIT-I

Introduction to Automata and Regular Expressions:

Introduction, Alphabets, Strings and Languages, Chomsky Hierarchy, Automata and Grammars, Regular Grammar and Language, Finite Automata, Deterministic finite Automata (DFA), Nondeterministic finite Automata (NFA), Equivalence of NFA and DFA, Minimization of Finite Automata, Regular Expressions, Converting Regular Grammar and Expression into Finite Automata, Pumping lemma for regular sets, Closure properties of regular sets (Without proof).

UNIT-II

Context Free Grammars and Pushdown Automata:

Context Free Language, Context Free Grammar, Derivation and Parse tree, Ambiguity, Simplification of CFG‘s, Chomsky Normal Form, Greibach Normal Form, Push Down

Automat (PDA), Design of PDA, Equivalence of PDA and CFL/CFG

UNIT-III

Turing Machines and Introduction to Compilers:

Turing Machine, TM Model, Language acceptance, Design of Turing Machine, Compilers, Phases of Compiler, The role of Lexical Analyzer, Input Buffering.

UNIT-IV

Parsers and Intermediate Code Generation:

Parser, Top-Down parsers: Recursive Descent Parsers, Predictive Parsers
Bottom–up Parsers: Shift-Reduce Parsing, LR parsers, Intermediate Code Generation: Three address codes.

UNIT-V

Code Optimization and Code Generation:

Code Optimization: Peephole optimization, Basic blocks and flow graphs, DAG, Principles of Source Code Optimization, Code Generation: Issues in Design of Code Generation, Simple Code Generator

TEXT BOOKS:

1. Introduction to Automata theory languages and Computation, Hopcroft H.E. and Ullman Jeffrey.D, 3/e, 2006, Pearson Education, New Delhi, India.
2. Mishra K L P and Chandrasekaran N, ―Theory of Computer Science - Automata, Languages and Computation‖, 2/e, 2007, PHI, New Delhi, India.
3. Compilers: Principles, Techniques, and Tools, Updated 2e July 2023 Alfred V. Aho , Monica S. Lam, Ravi Sethi , Jeffrey D. Ullman , Sorav Bansal.

REFERENCES BOOKS:

1. Introduction to Languages and Theory of Computation, John C Martin, 1/e, 2009, Tata McGraw Hill Education, Hyderabad, India.
2. Introduction to Theory of Computation, Sipser, 2/e, 2005, Thomson, Australia.
3. Compiler Construction: Principles And Practice, Kenneth C. Louden, Thomson/ Delmar Cengage Learning, 2006.
4. Lex &yacc, Doug Brown, John Levine and Tony Mason, 2 nd Edition, O‘reilly Media
5. Engineering a compiler, Keith Cooper and Linda Torczon, 2 nd Edition, Morgan Kaufmann, 2011.

ONLINE LEARNING RESOURCES:

1. https://nptel.ac.in/courses/106/104/106104028/
2. https://nptel.ac.in/courses/106/104/106104123/

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III B.Tech - I Sem.

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(23CS0519) INTRODUCTION TO QUANTUM TECHNOLOGIES AND APPLICATIONS
(Common to all Branches)

COURSE OBJECTIVES

The course is designed to

1. *Introduce fundamental quantum concepts like superposition and entanglement.*
2. *Understand theoretical structure of qubits and quantum information.*
3. *Explore conceptual challenges in building quantum computers.*
4. *Explain principles of quantum communication and computing.*
5. *Examine real-world applications and the future of quantum technologies*.

COURSE OUTCOMES:

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

1.Explain core quantum principles in a non-mathematical manner.
2.Compare classical and quantum information systems.
3.Identify theoretical issues in building quantum computers.
4.Discuss quantum communication and computing concepts.
5.Recognize applications, industry trends, and career paths in quantum technology.
6.Societal & ethical implications of quantum technologies

UNIT-I :

Introduction to Quantum Theory and Technologies

The transition from classical to quantum physics, Fundamental principles explained conceptually: Superposition, Entanglement, Uncertainty Principle, Wave-particle duality, Classical vs Quantum mechanics,theoretical comparison, Quantum states and measurement: nature of observation, Overview of quantum systems: electrons, photons, atoms, The concept of quantization: discrete energy levels,Why quantum? Strategic, scientific, and technological significance, A snapshot of quantum technologies: Computing, Communication, and Sensing, National and global quantum missions: India's Quantum Mission, EU, USA, China

UNIT-II :

Theoretical Structure of Quantum Information Systems

What is a qubit? Conceptual understanding using spin and polarization, Comparison: classical bits vs quantum bits, Quantum systems: trapped ions, superconducting circuits, photons (non-engineering view),Quantum coherence and decoherence,intuitive explanation, Theoretical concepts: Hilbert spaces, quantum states, operators,only

interpreted in abstract,The role of entanglement and non-locality in systems, Quantum information vs classical information: principles and differences,Philosophical implications: randomness, determinism, and observer role.

UNIT-III:

Building a Quantum Computer-Theoretical Challenges and Requirements

What is required to build a quantum computer (conceptual overview)?, Fragility of quantum systems: decoherence, noise, and control, Conditions for a functional quantum system: Isolation, Error management, Scalability, Stability, Theoretical barriers:
Why maintaining entanglement is difficult, Error correction as a theoretical necessity, Quantum hardware platforms (brief conceptual comparison),Superconducting circuits, Trapped ions, Photonics, Visionvs reality: what's working and what remains elusive,The role of quantum software in managing theoretical complexities

UNIT-IV:

Quantum Communication and Computing,Theoretical Perspective

Quantum vs Classical Information, Basics of Quantum Communication, Quantum Key Distribution (QKD),Role of Entanglement in Communication, The Idea of the Quantum Internet,Secure Global Networking, Introduction to Quantum Computing, Quantum Parallelism (Many States at Once),Classical vs Quantum Gates, Challenges: decoherence and Error Correction, Real-World Importance and Future Potential

UNIT-V :

Applications, Use Cases, and the Quantum Future

Real-world application domains: Healthcare (drug discovery), Material science, Logistics and optimization, Quantum sensing and precision timing, Industrial case studies: IBM, Google, Microsoft, Psi Quantum, Ethical, societal, and policy considerations, Challenges to adoption: cost, skills, standardization, emerging careers in quantum: roles, skillsets, and preparation pathways, Educational and research landscape,India's opportunity in the global quantum race.

TEXT BOOKS:

1. Michael A. Nielsen, Isaac L. Chuang, *Quantum Computation and Quantum Information*, Cambridge University Press, 10th Anniversary Edition, 2010.
2. Eleanor Rieffel and Wolfgang Polak, *Quantum Computing: A Gentle Introduction*, MIT Press, 2011.
3. Chris Bernhardt, *Quantum Computing for Everyone*, MIT Press, 2019.

REFERENCE BOOKS:

1. David McMahon, *Quantum Computing Explained*, Wiley, 2008.
2. Phillip Kaye, Raymond Laflamme, and Michele Mosca, *An Introduction to Quantum Computing*, Oxford University Press, 2007.
3. Scott Aaronson, *Quantum Computing Since Democritus*, Cambridge University Press, 2013.

4. Alastair I.M. Rae, *Quantum Physics: A Beginner's Guide*, Revised Edition, Oneworld Publications, 2005.
5. Eleanor G. Rieffel and Wolfgang H. Polak, *Quantum Computing: A Gentle Introduction*, MIT Press, 2011.
6. Leonard Susskind and Art Friedman, *Quantum Mechanics: The Theoretical Minimum*, Basic Books, 2014.
7. Bruce Rosenblum and Fred Kuttner, *Quantum Enigma: Physics Encounters Consciousness*, 2nd Edition, Oxford University Press, 2011.
8. Giuliano Benenti, Giulio Casati, and Giuliano Strini, *Principles of Quantum Computation and Information, Volume I: Basic Concepts*, World Scientific Publishing, 2004.
9. K.B. Whaley et al., *Quantum Technologies and Industrial Applications: European Roadmap and Strategy Document*, Quantum Flagship, European Commission, 2020.
10. Department of Science & Technology (DST), Government of India, *National Mission on Quantum Technologies & Applications,Official Reports and Whitepapers*, MeitY/DST Publications, 2020 onward.

ONLINE LEARNING RESOURCES:

1. IBM Quantum Experience and Qiskit Tutorials
2. Coursera,Quantum Mechanics and Quantum Computation by UC Berkeley
3. edX,The Quantum Internet and Quantum Computers
4. YouTube,Quantum Computing for the Determined by Michael Nielsen
5. Qiskit Textbook,IBM

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III B.Tech - I Sem.

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(23CS0532) OBJECT ORIENTED ANALYSIS AND DESIGN
(Professional Elective Course –I)
(Common to CSE, CAD & CCC)

COURSE OBJECTIVES
The course is designed to

1. *Describe the activities in the different phases of the object-oriented development lifecycle.*
2. *Understand the concepts of object-oriented model with the E-R and EER models.*
3. *Model a real-world application by using UML diagram.*
4. *Design architectural modelling.*
5. *Describing an application of UML.*

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

1. *The importance of modelling in UML.*
2. *Compare and contrast the object-oriented model with the E-R and EER models.*
3. *Design use case diagram. Design an application using deployment diagram.*
4. *Apply UML diagrams to build library application.*
5. *Construct class, sequence, and activity diagrams to represent dynamic and static aspects of a system.*
6. *Design complete object-oriented software solutions using appropriate UML tools and design principles*

UNIT -I
Introduction to UML:
Importance of modelling, principles of modelling, object-oriented modelling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT -II
Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams.
Advanced Structural Modelling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams.

UNIT -III

Basic Behavioural Modelling-I: Interactions, Interaction diagrams.

Basic Behavioural Modelling-II: Use cases, Use case Diagrams, Activity Diagrams.

UNIT -IV

Advanced Behavioral Modelling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Architectural Modelling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT -V

Patterns and Frameworks, Artifact Diagrams. Case Study: The Unified Library application.

TEXT BOOKS:

1. Grady Booch, James Rumbaugh, and Ivar Jacobson, *The Unified Modeling Language User Guide*, 2nd Edition, Pearson Education.
2. John W. Satzinger, Robert B. Jackson, and Stephen D. Burd, *Object-Oriented Analysis and Design with the Unified Process*, Cengage Learning.

REFERENCE BOOKS:

1. Meilir Page-Jones, *Fundamentals of Object-Oriented Design in UML*, Pearson Education.
2. Pascal Roques, *Modeling Software Systems Using UML2*, Wiley–Dreamtech India Pvt. Ltd.
3. Atul Kahate, *Object-Oriented Analysis and Design*, The McGraw-Hill Companies.
4. Mark Priestley, *Practical Object-Oriented Design with UML*, Tata McGraw-Hill (TMH).
5. Craig Larman, *Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified Process*, Pearson Education

ONLINE LEARNING RESOURCES:

1.https://www.coursera.org/learn/object-oriented-design

2.https://nptel.ac.in/courses/106105153

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(23CS0533) SOFT COMPUTING
(Professional Elective course – I)

COURSE OBJECTIVES

The course is designed to

1. *Familiarize with soft computing concepts*
2. *Introduce and use the idea of fuzzy logic and use of heuristics based on human experience*
3. *Familiarize the Neuro-Fuzzy modelling using Classification and Clustering techniques*
4. *Learn the concepts of Genetic algorithm and its applications*
5. *Acquire the knowledge of Rough Sets.*

COURSE OUTCOMES

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

1. *Identify the difference between Conventional Artificial Intelligence to computational Intelligence.*
2. *Understand fuzzy logic and reasoning to handle and solve engineering problems.*
3. *Apply the Classification techniques on various applications.*
4. *Perform various operations of genetic algorithms and Rough Sets.*
5. *Design hybrid systems by combining fuzzy logic, neural networks, and genetic algorithms for solving complex problems.*
6. *Evaluate soft computing models for accuracy, efficiency, and applicability in real-world engineering scenarios.*

UNIT - I

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT- II

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT- III

Fuzzy Decision Making, Particle Swarm Optimization.

UNIT- IV

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT- V

Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

TEXT BOOK:

1. B. K. Tripathy and J. Anuradha, *Soft Computing,Advances and Applications*, Cengage Learning, January 2015.
2. S. N. Sivanandam and S. N. Deepa, *Principles of Soft Computing*, 2nd Edition, Wiley India, 2008.

REFERENCE BOOKS:

1. David E. Goldberg, *Genetic Algorithms: In Search, Optimization and Machine Learning*, Pearson Education.
2. J. S. R. Jang, C. T. Sun, and E. Mizutani, *Neuro-Fuzzy and Soft Computing*, Pearson Education, 2004.
3. G. J. Klir and Bo Yuan, *Fuzzy Sets and Fuzzy Logic*, PHI Learning, 1995.
4. Melanie Mitchell, *An Introduction to Genetic Algorithms*, PHI Learning, 1998.
5. Timothy J. Ross, *Fuzzy Logic with Engineering Applications*, McGraw-Hill International Editions, 1995.

ONLINE LEARNING RESOURCES:

1.https://nptel.ac.in/courses/106105173

2.https://nptel.ac.in/courses/111107062

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(23EC0414) MICROPROCESSORS AND MICROCONTROLLERS
(Professional Elective course–I)
(Common to CSE, CAD, CCC & CIC)

COURSE OBJECTIVES

The objectives of this course

1. *To comprehend the architecture, operation, and configurations of the 8086 microprocessor.*
2. *To get familiar with 8086 programming concepts, instruction set, and assembly language development tools.*
3. *To study the interfacing of 8086 with memory, peripherals, and controllers for various applications.*
4. *To learn the architecture, instruction set, and programming of the 8051 micro controllers.*
5. *To understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.*

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to

1. *Recall and identify fundamental concepts of microprocessor and microcontroller architectures*
2. *Explain the working principles and operational characteristics of microprocessor and microcontroller systems*
3. *Develop assembly language programs and implement basic interfacing circuits*
4. *Analyze system requirements and design appropriate interfacing solutions*
5. *Assess and compare different microprocessor and microcontroller architectures and their applications*
6. *Design and implement complete microprocessor microcontroller based system*

UNIT-I

8086 Architecture: Main features, pin diagram/description, 8086 microprocessor family, internal architecture, bus interfacing UNIT - execution UNIT - interrupts and interrupt response, 8086 system timing, minimum mode and maximum mode configuration.

UNIT-II

8086 Programming: Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT-III

8086 Interfacing: Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Interfacing switches and LEDS, Interfacing seven segment displays, software and hardware interrupt applications, Intel 8251 USART architecture and interfacing, Intel 8237a DMA controller, stepper motor, A/D and D/A converters, Need for 8259 programmable interrupt controllers.

UNIT-IV

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

UNIT-V

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

TEXT BOOKS:

1. Douglas V. Hall and S. S. S. P. Rao, *Microprocessors and Interfacing: Programming and Hardware*, 3rd Edition, Tata McGraw-Hill Education Pvt. Ltd., 1994.
2. K. M. Bhurchandi and A. K. Ray, *Advanced Microprocessors and Peripherals*, 3rd Edition, McGraw-Hill Education, 2017.
3. Raj Kamal, *Microcontrollers: Architecture, Programming, Interfacing and System Design*, 2nd Edition, Pearson, 2012.

REFERENCES BOOKS:

1. Ramesh S. Gaonkar, *Microprocessor Architecture, Programming and Applications with the 8085*, 6th Edition, Penram International Publishing, 2013.
2. Kenneth J. Ayala, *The 8051 Microcontroller*, 3rd Edition, Cengage Learning, 2004

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(23CS0534) DATA WAREHOUSING & DATA MINING
(Professional Elective course –I)

COURSE OBJECTIVES

The course is designed to

1. *Familiarize with mathematical foundations of data mining tools.*
2. *Introduce classical models and algorithms in data warehouses and data mining.*
3. *Investigate the kinds of patterns that can be discovered by association rule mining, classification and clustering.*
4. *Explore data mining techniques in various applications like social, scientific an environmental context.*

COURSE OUTCOMES

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

1. *Design a Data warehouse system and perform business analysis with OLAP tools .*
2. *Apply suitable pre-processing and visualization techniques for data analysis*
3. *Apply frequent pattern and association rule mining techniques for data analysis*
4. *Design appropriate classification and clustering techniques for data analysis*
5. *Infer knowledge from raw data*
6. *Evaluate the performance and effectiveness of data mining models and techniques .*

UNIT- I:

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

UNIT- II:

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

UNIT- III:

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

UNIT- IV:

Decision Tree Induction,Bayesian Classification,Rule Based Classification,Classification by Back Propagation,Support Vector Machines — Lazy Learners,Model Evaluation and Selection- Techniques to improve Classification Accuracy. Clustering Techniques,Cluster analysis-Partitioning Methods,Hierarchical Methods,Density Based Methods,Grid Based Methods,Evaluation of clustering,Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

UNIT- V:

Datasets,Introduction, Iris plants database, Breast cancer database, Auto imports database,Introduction to WEKA, The Explorer,Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

TEXT BOOK:

1. Jiawei Han and Micheline Kamber, *Data Mining: Concepts and Techniques*, 3rd Edition, Elsevier, 2012.
2. Alex Berson and Stephen J. Smith, *Data Warehousing, Data Mining & OLAP*, Tata McGraw-Hill, 35th Reprint, 2016.

REFERENCES BOOKS:

1. Alex Berson and Stephen J. Smith, *Data Warehousing, Data Mining & OLAP*, Tata McGraw-Hill, 35th Reprint, 2016.
2. K. P. Soman, Shyam Diwakar, and V. Ajay, *Insight into Data Mining: Theory and Practice*, Eastern Economy Edition, Prentice Hall of India, 2006.
3. Ian H. Witten and Eibe Frank, *Data Mining: Practical Machine Learning Tools and Techniques*, 2nd Edition, Elsevier.

ONLINE LEARNING RESOURCES:

1. https://nptel.ac.in/courses/111104104
2. https://nptel.ac.in/courses/106105174

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(23CE0150) GREEN BUILDINGS
(OPEN ELECTIVE - I)

COURSE OBJECTIVES :

The objectives of this course are to make the student:

1. *To understand the fundamental concepts of green buildings, their necessity, and sustainable features.*
2. *To analyze green building concepts, rating systems, and their benefits in India.*
3. *To apply green building design principles, energy efficiency measures, and renewable energy sources.*
4. *To evaluate air conditioning systems, HVAC designs, and energy modeling for sustainable buildings.*
5. *To assess material conservation strategies, waste management, and indoor environmental quality in green buildings.*

COURSE OUTCOMES :

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

1. *Choose appropriate materials and techniques for achieving the goal of green buildings during their design.*
2. *Analyze market opportunities, resources, different practices of green buildings and its effects on environment*
3. *Evaluate energy efficiency in design of green buildings*
4. *Design effective and eco-friendly green buildings*
5. *Apply natural air conditioning and lighting techniques in design of green buildings*
6. *Conserve materials, water and maintain quality of environment in construction of green buildings*

UNIT – I

Introduction to Green buildings: Necessity of Green Buildings, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing a Green Building, Important Sustainable Features for Green Buildings.

UNIT – II

Green Building Concepts and Practices: Indian Green Building Council, Green Building Movement in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities and Benefits: Opportunities of Green Buildings, Green Building Features, Material and

Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy-Saving Approaches in Buildings, LEED India Rating System, and Energy Efficiency.

UNIT – III

Green Building Design: Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximizing System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources, Eco-Friendly Captive Power Generation for Factories, Building Requirements.

UNIT – IV

Air Conditioning: Introduction, CII Godrej Green Business Centre, Design Philosophy, Design Interventions, Energy Modelling, HVAC System Design, Chiller Selection, Pump Selection, Selection of Cooling towers, Selection of Air Handling Units, Pre-Cooling of Fresh Air, Interior Lighting Systems, Key Features of The Building, Eco-Friendly Captive Power Generation for Factories, Building Requirements.

UNIT – V

Material Conservation: Handling of Non-Process Waste, Waste Reduction During Construction, Materials With Recycled Content, Local Materials, Material Reuse, Certified Wood, Rapidly Renewable Building Materials and Furniture. Indoor Environment Quality and Occupational Health – Air Conditioning, Indoor Air Quality, Sick Building Syndrome, tobacco Smoke.

TEXT BOOKS

1. Indian Society of Heating Refrigerating and Air conditioning Engineers, *Handbook on Green Practice,* 2025
2. Tom Woolley and Sam Kimings, *Green Building Hand Book*, 2009

REFERENCES

1. Trish riley, *Complete Guide to Green Buildings*
2. Kent Peterson, *Standard for the design for High Performance Green Buildings,* 2009
3. *Energy Conservation Building Code –ECBC*, BEE published, 2020
4. Dr.G.Prabhakaran, *Green Buildings and Eco-Engineering,* Vinsa Publishing, 1st edition, 2025

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(23CE0151) CONSTRUCTION TECHNOLOGY AND MANAGEMENT (OPEN ELECTIVE - I)

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand project management fundamentals, organizational structures, and leadership principles in construction.*
2. *Analyse manpower planning, equipment management, and cost estimation in civil engineering projects.*
3. *Apply planning, scheduling, and project management techniques such as CPM and PERT.*
4. *Evaluate various contract types, contract formation, and legal aspects in construction management.*
5. *Assess safety management practices, accident prevention strategies, and quality management systems in construction.*

COURSE OUTCOMES (COs)

Upon successful completion of this course, students will be able to:

1. *Realize objectives, functions, public relations and management structure in projects*
2. *Plan and care the human resource needed for the project and can fix the rent of the construction equipment and can perform benefit cost analysis.*
3. *Apply different techniques in scheduling of projects.*
4. *Formulate CPM/PERT networks to evaluate the project completion time and also monitor the project during its life cycle.*
5. *Draft a contract document by incorporating various clauses as per Indian Contract act.*
6. *Implement safety measures to reduce construction related accidents*

UNIT -I

Introduction: Project forms, Management Objectives and Functions; Organizational Chart of A Construction Company; Manager's Duties and Responsibilities; Public Relations; Leadership and Team - Work; Ethics, Morale, Delegation and Accountability

UNIT -II

Man and Machine: Man-Power Planning, Training, Recruitment, Motivation, Welfare Measures and Safety Laws; Machinery for Civil Engineering., Earth Movers and Hauling.Costs, Factors Affecting Purchase, Rent, and Lease of Equipment, and Cost Benefit Estimation.

UNIT -III

Planning, Scheduling and Project Management: Planning Stages, Construction Schedules and Project Specification, Monitoring and Evaluation; Bar-Chart, CPM, PERT, Network- formulation and Time Computation.

UNIT -IV

Contracts: Types of Contracts, formation of Contract,Contract Conditions,Contract for Labor, Material, Design, Construction,Drafting of Contract Documents Based On IBRD/ MORTH Standard Bidding Documents,Construction Contracts,Contract Problems,Arbitration and Legal Requirements Computer Applications in Construction Management: Software for Project Planning, Scheduling and Control.

UNIT -V

Safety Management: Implementation and Application of QMS in Safety Programs, ISO 9000 Series, Accident Theories, Cost of Accidents, Problem Areas in Construction Safety, Fall Protection, Incentives, Zero Accident Concepts, Planning for Safety, Occupational Health and Ergonomics.

TEXT BOOKS:

1. SK. Sears, GA. Sears and RH. Cloug, *Construction Project Management*, John Wiley and Sons, 6th Edition, 2016.
2. Saleh Mubarak, *Construction Project Scheduling and Control*, 4th Edition, 2019

REFERENCE BOOKS:

1. Brien, J.O. and Plotnick, F.L., *CPM in Construction Management*, McGraw Hill, 2015.
2. Punmia, B.C., and Khandelwal, K.K., *Project Planning and control with PERT and CPM*, Laxmi Publications, 2023.
3. Stephens Nunnally, *Construction Methods and Management*, Pearson New International, 8th Edition, Pearson, 2010
4. Rhoden, M and Cato B, *Construction Management and Organizational Behaviour*, Wiley-Blackwell, 2016.

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(23EE0261) ELECTRICAL SAFETY PRACTICES AND STANDARDS
(Open Elective-I)

COURSE OBJECTIVES

The objectives of this course are

1. *To understand the basic principles of electrical safety, effects of electric shock, and hazards like arc and blast.*
2. *To learn about safety equipment, overvoltage protection, and fire prevention methods in electrical systems.*
3. *To gain knowledge of grounding practices, bonding methods, and maintaining safe distances in electrical environments.*
4. *To become familiar with electrical safety standards, regulations, and practical safety practices in various installations.*

COURSE OUTCOMES

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

1. *Understanding the Fundamentals of Electrical Safety*
2. *Identifying and Applying Safety Components*
3. *Analyzing Grounding Practices and Electrical Bonding*
4. *Applying Safety Practices in Electrical Installations and Environments*
5. *Identify various national and international standards and statutory requirements related to electrical safety.*
6. *Compare and interpret the applications of different electrical safety codes and regulations*

UNIT I

Introduction To Electrical Safety:

Fundamentals of Electrical safety-Electric Shock- physiological effects of electric current - Safety requirements –Hazards of electricity- Arc - Blast- Causes for electrical failure.

UNIT II

Safety Components:

Introduction to conductors and insulators- voltage classification -safety against over voltages- safety against static electricity-Electrical safety equipment‘s - Fire extinguishers for electrical safety.

UNIT III

Grounding:

General requirements for grounding and bonding- Definitions- System grounding- Equipment grounding - The Earth - Earthing practices- Determining safe approach distance-Determining arc hazard category.

UNIT IV

Safety Practices:

General first aid- Safety in handling hand held electrical appliances tools- Electrical safety in train stations-swimming pools, external lighting installations, medical locations- Case studies.

UNIT V

Standards For Electrical Safety:

Electricity Acts- Rules & regulations- Electrical standards-NFPA 70 E-OSHA standards- IEEE standards-National Electrical Code 2005,National Electric Safety code NESC- Statutory requirements from electrical inspectorate

TEXT BOOKS:

1. Massimo A. G. Mitolo, *Electrical Safety of Low-Voltage Systems*, McGraw-Hill, USA, 2009.
2. Mohamed El-Sharkawi, *Electric Safety: Practice and Standards*, CRC Press, USA, 2014.

REFERENCE BOOKS

1. Kenneth G. Mastrullo and Ray A. Jones, *The Electrical Safety Program Book*, 2nd Edition, Jones & Bartlett Publishers, London, 2011.
2. Palmer Hickman, *Electrical Safety–Related Work Practices*, Jones & Bartlett Publishers, London, 2009.
3. W. Fordham Cooper, *Electrical Safety Engineering*, Butterworth and Company, London, 1986.
4. John Cadick, Mary Capelli-Schellpfeffer, and Dennis K. Neitzel, *Electrical Safety Handbook*, 4th Edition, McGraw-Hill, New York, USA, 2012.

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(23ME0356) SUSTAINBLE ENERGY TECHNOLOGIES
(Open Elective-I)

COURSE OBJECTIVES

The objectives of the course are to

1. *To demonstrate the importance the impact of solar radiation, solar PV modules*
2. *To understand the principles of storage in PV systems*
3. *To discuss solar energy storage systems and their applications.*
4. *To get knowledge in wind energy and bio-mass*
5. *To gain insights in geothermal energy, ocean energy and fuel cells*.

COURSE OUTCOMES

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

1. *Illustrate the importance of solar radiation and solar PV modules.*
2. *Discuss the storage methods in PV systems*
3. *Explain the solar energy storage for different applications*
4. *Understand the principles of wind energy, and bio-mass energy.*
5. *Attain knowledge in geothermal energy, ocean energy and fuel cells.*
6. *Explain the principles of sustainability and the environmental, social, economic aspects of energy use*

UNIT I

SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems.

SOLAR PV MODULES AND PV SYSTEMS:

PV Module Circuit Design, Module Structure, Packing Density, Interconnections, Mismatch and Temperature Effects, Electrical and Mechanical Insulation, Lifetime of PV Modules, Degradation and Failure, PV Module Parameters, Efficiency of PV Module, Solar PV Systems-Design of Off Grid Solar Power Plant. Installation and Maintenance.

UNIT II

STORAGE IN PV SYSTEMS:

Battery Operation, Types of Batteries, Battery Parameters, Application and Selection of Batteries for Solar PV System, Battery Maintenance and Measurements, Battery Installation for PV System.

UNIT III

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation.

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

UNIT IV

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

BIO-MASS: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, utilization for cooking, bio fuels, I.C. engine operation and economic aspects.

UNIT V

GEOTHERMAL ENERGY: Origin, Applications, Types of Geothermal Resources, Relative Merits

OCEAN ENERGY: Ocean Thermal Energy; Open Cycle & Closed Cycle OTEC Plants, Environmental Impacts, Challenges

FUEL CELLS: Introduction, Applications, Classification, Different Types of Fuel Cells Such as Phosphoric Acid Fuel Cell, Alkaline Fuel Cell, PEM Fuel Cell, MC Fuel Cell.

TEXTBOOKS

1. S. P. Sukhatme and J. K. Nayak, *Solar Energy,Principles of Thermal Collection and Storage*, Tata McGraw-Hill.
2. B. H. Khan, *Non-Conventional Energy Resources*, Tata McGraw-Hill, New Delhi, 2006.

REFERENCE BOOKS

1. D. Yogi Goswami, Frank Kreith, and John F. Kreider, *Principles of Solar Engineering*, Taylor & Francis.
2. Ashok V. Desai, *Non-Conventional Energy*, New Age International (P) Ltd.
3. Ramesh and Kumar, *Renewable Energy Technologies*, Narosa Publishing House.
4. G. D. Roy, *Non-Conventional Energy Source*, Standard Publishers.

ONLINE LEARNING RESOURCES:

1.https://nptel.ac.in/courses/112106318

2.https://youtube.com/playlist?list=PLyqSpQzTE6M-ZgdjYukayF6QevPv7WE-r&si=-mwIa2X-SuSiNy13

3.https://youtube.com/playlist?list=PLyqSpQzTE6M-djYukayF6QevPv7WE-

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(23EC0406) ELECTRONIC CIRCUITS
(Open Elective-I)

COURSE OBJECTIVES

The objectives of the course are to

1. *To understand semiconductor diodes, their characteristics and applications.*
2. *To explore the operation, configurations, and biasing of BJTs.*
3. *To study the operation, analysis, and coupling techniques of BJT amplifiers.*
4. *To learn the operation, applications and uses of feedback amplifiers and oscillators.*
5. *To analyze the characteristics, configurations, and applications of operational amplifiers.*

COURSE OUTCOMES

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

1. *Explain the operation and characteristics of PN junction diodes and special-purpose diodes such as Zener, Tunnel, LED, Varactor, and Photodiode.*
2. *Analyze the behavior of rectifier circuits (half-wave, full-wave, and bridge) with and without filters, and describe clipping and clamping circuits.*
3. *Demonstrate the operation of Bipolar Junction Transistors in different configurations and evaluate suitable biasing techniques for amplifier stability.*
4. *Compare the performance of single and multistage amplifiers using different coupling methods and analyze the simplified hybrid model in CE, CB, and CC configurations.*
5. *Classify feedback amplifiers and oscillators, and construct basic RC and LC oscillator circuits to meet required oscillation conditions.*
6. *Apply operational amplifier concepts to design and implement analog signal processing applications such as summing amplifiers, integrators, differentiators, and comparators.*

UNIT-I

Semiconductor Diode and Applications: Introduction, PN junction diode,structure, operation and VI characteristics, Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Positive and Negative Clipping and Clamping circuits (Qualitative treatment only).

Special Diodes: Zener and Avalanche Breakdowns, VI Characteristics of Zener diode, Zener diode as voltage regulator, Construction, operation and VI characteristics of Tunnel Diode, LED, Varactor Diode, Photo Diode

UNIT-II

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch and Amplifier, Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Bias Stability, Bias Compensation using Diodes.

UNIT-III

Single stage amplifiers: Classification of Amplifiers - Distortion in amplifiers, Analysis of CE, CC and CB configurations with simplified hybrid model.

Multistage amplifiers: Different Coupling Schemes used in Amplifiers - RC coupled amplifiers, Transformer Coupled Amplifier, Direct Coupled Amplifier; Multistage RC coupled BJT amplifier (Qualitative treatment only).

UNIT-IV

Feedback amplifiers: Concepts of feedback, Classification of feedback amplifiers, Effect of feedback on amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations (Qualitative treatment only).

Oscillators: Classification of oscillators, Condition for oscillations, RC Phase shift Oscillators, Generalized analysis of LC Oscillators-Hartley and Colpitts Oscillators, Wien Bridge Oscillator.

UNIT-V

Op-amp: Classification of IC'S, basic information of Op-amp, ideal and practical Op-amp, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

Applications of op-amp : Summing, scaling and averaging amplifiers, Integrator, Differentiator, phase shift oscillator and comparator.

TEXTBOOKS

1. J. Millman and Christos C. Halkias, *Electronic Devices and Circuits*, 3rd Edition, Tata McGraw-Hill, 2006.
2. David A. Bell, *Electronic Devices and Circuit Theory*, 5th Edition, Oxford University Press, 2008.

REFERENCE BOOKS

1. R. L. Boylestad, Louis Nashelsky, and K. Lal Kishore, *Electronic Devices and Circuit Theory*, 12th Edition, Pearson, 2006.
2. N. Salivahanan and N. Suresh Kumar, *Electronic Devices and Circuits*, 3rd Edition, Tata McGraw-Hill, 2012.
3. S. Sedra and K. C. Smith, *Microelectronic Circuits*, 5th Edition, Oxford University Press.

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(23HS0855) MATHEMATICS FOR MACHINE LEARNING AND AI
(Open Elective-I)

COURSE OBJECTIVES

The course is designed to

1. *To provide a strong mathematical foundation for understanding and developing AI/ML algorithms.*
2. *To enhance the ability to apply linear algebra, probability, and calculus in AI/ML models.*
3. *To equip students with optimization techniques and graph-based methods used in AI applications.*
4. *To develop critical problem-solving skills for analysing mathematical formulations in AI/ML.*

COURSE OUTCOMES

After successful completion of this course, the students should be able to:

1. *Apply linear algebra concepts to ML techniques like PCA and regression.*
2. *Analyze probabilistic models and statistical methods for AI applications.*
3. *Implement optimization techniques for machine learning algorithms.*
4. *Apply the fundamental concepts of Gradient Descent in machine learning to choose the right optimization algorithm*
5. *Utilize vector calculus and transformations in AI-based models.*
6. *Develop graph-based AI models using mathematical representations*

UNIT I: Linear Algebra for Machine Learning

Review of Vector spaces, basis, linear independence, Vector and matrix norms, Matrix factorization techniques, Eigenvalues, eigenvectors, diagonalization, Singular Value Decomposition (SVD) and Principal Component Analysis (PCA).

UNIT II: Probability and Statistics for AI

Probability distributions: Gaussian, Binomial, Poisson. Bayes‘ Theorem, Maximum Likelihood Estimation (MLE), and Maximum a Posteriori (MAP).Entropy and Kullback-Leibler (KL) Divergence in AI, Cross entropy loss, Markov chains.

UNIT III: Optimization Techniques for ML

Multivariable calculus: Gradients, Hessians, Jacobians. Constrained optimization:

Lagrange multipliers and KKT conditions. Gradient Descent and its variants (Momentum, Adam) Newton‘s method, BFGS method.

UNIT IV: Vector Calculus & Transformations

Vector calculus: Gradient, divergence, curl. Fourier Transform & Laplace Transform in ML applications.

UNIT V: Graph Theory for AI

Graph representations: Adjacency matrices, Laplacian matrices. Bayesian Networks & Probabilistic Graphical Models. Introduction to Graph Neural Networks (GNNs).

TEXT BOOKS:

1. Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong, *Mathematics for Machine Learning*, Cambridge University Press, 2020.
2. Christopher Bishop, *Pattern Recognition and Machine Learning*, Springer.

REFERENCE BOOKS

1. Gilbert Strang, *Linear Algebra and Its Applications*, Cengage Learning, 2016.
2. Jonathan Gross and Jay Yellen, *Graph Theory and Its Applications*, CRC Press, 2018.

ONLINE LEARNING RESOURCES:

1. MIT– Mathematics for Machine Learning https://ocw.mit.edu
2. Stanford CS229,Machine Learning Course https://cs229.stanford.edu/
3. DeepAI,Mathematical Foundations for AI https://deepai.org

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(23HS0842) MATERIALS CHARACTERIZATION TECHNIQUES
(Open Elective-I)
(Common to all branches of Engineering)

COURSE OBJECTIVES

The course is designed to

1. *To provide exposure to different characterization techniques.*
2. *To explain the basic principles and analysis of different spectroscopic techniques.*
3. *To elucidate the working of Scanning electron microscope - Principle, limitations and applications.*
4. *To illustrate the working of the Transmission electron microscope (TEM) - SAED patterns and its applications.*
5. *To educate the uses of advanced electric and magnetic instruments for characterization.*

COURSE OUTCOMES

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

1. *Analyze the crystal structure and crystallite size by various methods*
2. *Analyze the morphology of the sample by using a Scanning Electron Microscope*
3. *Analyze the morphology and crystal structure of the sample by using transmission Electron Microscope.*
4. *Explain the difference between SEM and TEM*
5. *Explain the principle and experimental arrangement of various spectroscopic technique*
6. *Identify the construction and working principle of various Electrical & Magnetic Characterization technique*

UNIT I Structure analysis by Powder X-Ray Diffraction

Introduction, Bragg‘s law of diffraction, Intensity of Diffracted beams, Factors affecting Diffraction, Intensities, Structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherer and Williamson-Hall (W-H) Methods, Small angle X-ray scattering (SAXS) (in brief).

UNIT II Microscopy technique -1 –Scanning Electron Microscopy (SEM)

Introduction, Principle, Construction and working principle of Scanning Electron Microscopy, Specimen preparation, Different types of modes used (Secondary Electron and Backscatter Electron), Advantages, limitations and applications of SEM.

UNIT III Microscopy Technique -2 - Transmission Electron Microscopy (TEM)

Construction and Working principle, Resolving power and Magnification, Bright and

dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy, Difference between SEM and TEM, Advantage and Limitations of Transmission Electron Microscopy.

UNIT IV Spectroscopy techniques

Principle, Experimental arrangement, Analysis and advantages of the spectroscopic techniques (i) UV-Visible spectroscopy (ii) Raman Spectroscopy, (iii) Fourier Transform infrared (FTIR) spectroscopy, (iv) X-ray photoelectron spectroscopy (XPS).

UNIT V Electrical & Magnetic Characterization techniques

Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method, Vibrating sample Magnetometer (VSM) and SQUID.

TEXT BOOKS:

1. Yang Leng, *Material Characterization: Introduction to Microscopic and Spectroscopic Methods*, John Wiley & Sons (Asia) Pvt. Ltd., 2013.
2. David Brandon and Wayne D. Kaplan, *Microstructural Characterization of Materials*, John Wiley & Sons Ltd., 2008.

REFERENCE BOOKS:

1. Colin Neville Banwell and Elaine M. McCash, *Fundamentals of Molecular Spectroscopy*, 4th Edition, Tata McGraw-Hill, 2008.
2. Bernard Dennis Cullity and Stuart R. Stock, *Elements of X-Ray Diffraction*, Prentice Hall, 2001.
3. Khalid Sultan, *Practical Guide to Materials Characterization: Techniques and Applications*, Wiley, 2021.
4. Sam Zhang, Lin Li, and Ashok Kumar, *Materials Characterization Techniques*, CRC Press, 2008.

NPTEL COURSES LINK :

1. https://nptel.ac.in/courses/115/103/115103030/
2. https://nptel.ac.in/content/syllabus_pdf/113106034.pdf
3. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-mm08/

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(23HS0806) CHEMISTRY OF ENERGY SYSTEMS
(Open Elective-I)

COURSE OBJECTIVES

The course is designed to

1. *To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.*
2. *To understand the basic concepts of processing and limitations of fuel cells and their applications.*
3. *To impart knowledge to the students about fundamental concepts of photochemical cells, reactions and applications.*
4. *Necessity of harnessing alternate energy resources such as solar energy and its basic concepts.*
5. *To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquefaction method.*

COURSE OUTCOMES

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

1. *Understand the problems based on electrode potential and concept of batteries.*
2. *Apply fuel technology in various energy and engineering contexts.*
3. *Analyze the design and working mechanisms and applications of photo electrochemical cells.*
4. *Analyze the advantages of photoelectric catalytic process such as high efficiency, low*
5. *environmental impact and renewable energy applications.*
6. *Apply the electrochemical principles to photo voltaic cell, solar power and solar cells.*

UNIT-1:

Electrochemical Systems: Galvanic cell, Nernst equation, standard electrode potential, application of EMF, electrical double layer, polarization, Batteries-Introduction ,Lead-acid ,Nickel- cadmium, Lithium ion batteries and their applications**.**

UNIT-2:

Fuel Cells: Fuel cell- Introduction, Basic design of fuel cell, working principle, Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), Fuel cell efficiency and applications.

UNIT-3:

Photo and Photo electrochemical Conversions: Photochemical cells Introduction and

applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions and their applications.

UNIT-4:

Solar Energy: Introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar cells and applications.

UNIT-5:

Hydrogen Storage: Hydrogen storage and delivery: State-of-the art, Established technologies, Chemical and Physical methods of hydrogen storage, Compressed gas storage, Liquid hydrogen storage, Other storage methods, Hydrogen storage in metal hydrides, metal organic frameworks (MOF), Metal oxide porous structures, hydrogel , and Organic hydrogen carriers.

TEXT BOOKS:

1. Ira N. Levine, *Physical Chemistry*.
2. B. S. Bahl, Arun Bahl, and G. D. Tuli, *Essentials of Physical Chemistry*.
3. Peter Atkins and Tina Overton, *Inorganic Chemistry* (also known as *Shriver and Atkins' Inorganic Chemistry*), Oxford University Press.

REFERENCE BOOKS:

1. *Fuel Cell Handbook*, 7th Edition, U.S. Department of Energy (EG&G Technical Services and Corporation).
2. Arvind Tiwari and Shyam, *Handbook of Solar Energy and Applications*.
3. Klaus Jäger, Olindo Isabella, Arno Smets, René van Swaaij, and Miro Zeman, *Solar Energy: Fundamentals, Technology and Systems*.
4. Levine Klebanoff, *Hydrogen Storage: Technologies and Materials*

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(23HS0821) ENGLISH FOR COMPETITIVE EXAMINATIONS

(Open Elective-I)
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The course is designed to

1. *To enable the students to learn about the structure of competitive English*
2. *To understand the grammatical aspects and identify the errors*
3. *To enhance verbal ability and identify the errors*
4. *To improve word power to answer competitive challenges*
5. *To make them ready to crack competitive exams*

COURSE OUTCOMES:

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

1. *Identify the basics of English grammar and its importance*
2. *Explain the use of grammatical structures in sentences*
3. *Demonstrate the ability to use various concepts in grammar and vocabulary and their applications in everyday use and in competitive exams*
4. *Analyze an unknown passage and reach conclusions about it.*
5. *Choose the appropriate form of verbs in framing sentences*
6. *Develop speed reading and comprehending ability thereby perform better in competitive exams*

UNIT - I

GRAMMAR-1

Nouns-classification-errors-Pronouns-types-errors-Adjectives-types-errors-Articles-definite-indefinite - Degrees of Comparison-Adverbs-types- errors-Conjunctions-usage-repositions-usage-Tag Questions, types-identifying errors- Practice.

UNIT- II

GRAMMAR-2

Verbs-tenses- structure-usages- negatives- positives- time adverbs-Sequence of tenses--If Clause- Voice-active voice and passive voice- reported Speech-Agreement- subject and verb-Modals-Spotting Errors-Practices

UNIT- III

VERBAL ABILITY

Sentence completion-Verbal analogies-Word groups-Instructions-Critical reasoning-Verbal deduction- Select appropriate pair-Reading Comprehension-Paragraph-Jumbles-Selecting the proper statement by reading a given paragraph.

UNIT -IV

READING COMPREHENSION AND VOCUBULARY

Competitive Vocabulary :Word Building,Memory techniques-Synonyms, Antonyms, Affixes-Prefix &Suffix-One word substitutes-Compound words-Phrasal Verbs-Idioms and Phrases-Homophones-Linking Words-Modifiers-Intensifiers - Mastering Competitive Vocabulary- Cracking the unknowing passage-speed reading techniques- Skimming & Scanning-types of answering–Elimination methods

UNIT - V

WRITING FOR COMPETITIVE EXAMINATIONS

Punctuation- Spelling rules- Word order-Sub Skills of Writing- Paragraph meaning-salient features-types - Note-making, Note-taking, summarizing-precise writing- Paraphrasing-Expansion of proverbs- Essay writing-types

TEXT BOOKS:

1. Wren & Martin, *English for Competitive Examinations*, S. Chand & Co., 2021.
2. *Objective English for Competitive Examination*, Tata McGraw Hill, New Delhi, 2014.

REFERENCE BOOKS:

1. Hari Mohan Prasad, *Objective English for Competitive Examination*, Tata McGraw Hill, New Delhi, 2014.
2. Philip Sunil Solomon, *English for Success in Competitive Exams*, Oxford University Press, 2016.
3. Shalini Verma, *Word Power Made Handy*, S. Chand Publications.
4. Neira, Anjana Dev & Co., *Creative Writing: A Beginner's Manual*, Pearson Education India, 2008.
5. Abhishek Jain, *Vocabulary Learning Techniques Vol. I & II*, RR Global Publishers, 2013.
6. Michel Swan, *Practical English Usage*, Oxford University Press, 2006.

ONLINE RESOURCES

1. https://www.grammar.cl/english/parts-of-speech.htm
2. https://academicguides.waldenu.edu/writingcenter/grammar/partsofspeech
3. https://learnenglish.britishcouncil.org/grammar/english-grammar reference/active-

passive-voice
4. https://languagetool.org/insights/post/verb-tenses/
5. https://www.britishcouncil.in/blog/best-free-english-learning-resources-british-ouncil

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(23HS0822) ENTREPRENEURSHIP AND NEW VENTURE CREATION
(Open Elective-I)

COURSE OBJECTIVES

The objectives of this course is to

1. *To foster an entrepreneurial mind-set for venture creation and entrepreneurial leadership*
2. *To encourage creativity and innovation*
3. *To enable them to learn pitching and presentation skills*
4. *To make the students understand MVP development and validation techniques to determine Product-Market fit and Initiate Solution design, Prototype for Proof of Concept*
5. *To enhance the ability of analyzing Customer and Market segmentation, estimate Market size, develop and validate Customer Persona*

COURSE OUTCOMES

By the end of the program students will be able to

1. *Develop an entrepreneurial mindset and appreciate the concept of entrepreneurship*
2. *Comprehend the process of problem-opportunity identification through design thinking, identify market potential and customers while developing a compelling value proposition solution*
3. *Analyze and refine business models to ensure sustainability and profitability*
4. *Build Prototype for Proof of Concept and validate MVP of their practice venture idea*
5. *Create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture*
6. *Prepare and deliver an investible pitch deck of their practice venture to attract stakeholders*

UNIT I

Entrepreneurship Fundamentals and context - Meaning and concept, attributes and mindset of entrepreneurial and entrepreneurial leadership, role models in each and their role in economic development. An understanding of how to build entrepreneurial mindset, skill sets, attributes and networks while on campus.

Core Teaching Tool: Simulation, Game, Industry Case Studies (Personalized for students – 16 industries to choose from), Venture Activity

UNIT II

Problem & Customer Identification - Understanding and analysing the macro-Problem and Industry perspective technological, socioeconomic and urbanization trends and their implication on new opportunities Identifying passion- identifying and defining problem using Design thinking principles-Analysing problem and validating with the potential customer - Understanding customer segmentation, creating and validating customer personas.

Core Teaching Tool: Several types of activities including Class, game, Gen AI, _Get out of the Building'and Venture Activity.

UNIT III

Solution design, Prototyping & Opportunity Assessment and Sizing

Understanding Customer Jobs-to-be-done and crafting innovative solution design to map to customer's needs and create a strong value proposition. Understanding prototyping and Minimum Viable product (MVP) - Developing a feasibility prototype with differentiating value, features and benefits - Assess relative market position via competition analysis - Sizing the market and assess scope and potential scale of the opportunity.

Core Teaching Tool: Venture Activity, no-code Innovation tools, Class activity

UNIT-IV

Business & Financial Model, Go-to-Market Plan - Introduction to Business model and types, Lean approach, 9 block lean canvas model, riskiest assumptions to Business models. Importance of Build - Measure – Lean approach.

Business planning: components of Business plan- Sales plan, People plan and financial plan. **Financial Planning:** Types of costs, preparing a financial plan for profitability using financial template, understanding basics of Unit economics and analysing financial performance.

Introduction to Marketing and Sales, Selecting the Right Channel, creating digital presence, building customer acquisition strategy. Choosing a form of business organization specific to your venture

Identifying sources of funds: Debt& Equity, Map the Start-up Life-cycle to Funding Options.

Core Teaching Tool: Founder Case Studies – Sama and Securely Share; Class activity and discussions; Venture Activities.

UNIT-V

Scale Outlook and Venture Pitch readiness - Understand and identify potential and aspiration for scale vis-a-vis your venture idea. Persuasive Storytelling and

its key components. Build an Investor ready pitch deck.

Core Teaching Tool: Expert talks; Cases; Class activity and discussions; Venture Activities.

TEXT BOOKS

1. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha Entrepreneurship, McGrawHill, 11th Edition.(2020)
2. Ries, E. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business,(2011).
3. Osterwalder, A., & Pigneur, Y. Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons. (2010).

REFERENCES

1. Simon Sinek,Start with Why, Penguin Books limited. (2011)
2. Brown Tim,Change by Design Revised & Updated: How Design Thinking
3. Transforms Organizations and Inspires Innovation, Harper Business.(2019)
4. Namita Thapar (2022) The Dolphin and the Shark: Stories on Entrepreneurship, Penguin Books Limited
5. Saras D. Sarasvathy, (2008) Effectuation: Elements of Entrepreneurial Expertise, Elgar Publishing *Ltd.*

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(23CS0520) ARTIFICIAL INTELLIGENCE LAB

COURSE OBJECTIVES

The course is designed to

1. *The student should be made to study the concepts of Artificial Intelligence.*
2. *The student should be made to learn the methods of solving problems using Artificial Intelligence.*
3. *The student should be made to introduce the concepts of Expert Systems and machine learning.*

COURSE OUTCOMES

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

1. *Understand the Mathematical and statistical prospectives of machine learning.*
2. *Analyze algorithms through python programming*
3. *Appreciate the importance of visualization in the data analytics solution.*
4. *Derive insights using Machine learning algorithms*
5. *Implement and demonstrate AI and ML algorithms.*
6. *Evaluate different algorithms.*

LIST OF EXPERIMENTS

1. Write a Program to Implement Breadth First Search using Python.
2. Write a program to implement Best First Searching Algorithm
3. Write a Program to Implement Depth First Search using Python.
4. Write a program to implement the Heuristic Search
5. Write a python program to implement A* and AO* algorithm. (Ex: find the shortest path)
6. Write a Program to Implement Water-Jug problem using Python.
7. Write a Program to Implement Alpha-Beta Pruning using Python.
8. Write a Program to implement 8-Queens Problem using Python.
9. Write a program to schedule a meeting among a 5 busy people using Default Reasoning the output should give the time, place and day of the meeting.
10. Write a program to implement the Unification algorithm
11. Develop a knowledge base system consisting of facts and rules about some specialized knowledge domain
12. Write a program to implement 8 puzzle programs using different heuristics. Using it play the game Tic-Tac-Toe at the end the game the program should display the no.

of nodes generated, cutoff values at each stage in the form of a table.

TEXT BOOKS:

1. PrateekJoshi,Artificial Intelligence with Python,Packt Publishing, 2017.
2. Xiao, Perry. Artificial intelligence programming with Python: from zero to hero. John Wiley & Sons, 2022.

REFERENCE BOOKS:

1. Stuart J. Russell and Peter Norvig, Artificial Intelligence A Modern Approach, Fourth Edition, Pearson, 2020
2. Martin C. Brown (Author), ―Python: The Complete Reference‖ McGraw Hill Education, Fourth edition, 2018
3. R. NageswaraRao , ―Core Python Programming‖ Dreamtech Press India Pvt Ltd 2018.

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc19_cs40/previe
2. https://onlinecourses.nptel.ac.in/noc19_cs41/preview

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(23CS0521) COMPUTER NETWORKS & INTERNET PROTOCOLS LAB
(Common to CSE, CCC)

COURSE OBJECTIVES

The course is designed to

1. *To understand the working principle of various communication protocols.*
2. *To understand the network simulator environment and*
3. *To visualize a network topology observe its performance*
4. *To analyze the traffic flow and the contents of protocol frames.*
5. *Familiarize with the applications of Internet.*

COURSE OUTCOMES:

After completion of the course, students will be able to

1. *Design scripts for Wired network simulation*
2. *Design scripts of static and mobile wireless networks simulation*
3. *Analyze the data traffic using tools*
4. *Design JAVA programs for client-server communication*
5. *Construct a wired and wireless network using the real hardware*
6. *Implement basic network security mechanisms and simulate secure data transmission scenarios.*

LIST OF EXPERIMENTS:

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
3. Implement Dijkastra‘s algorithm to compute the shortest path through a network
4. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
5. Implement distance vector routing algorithm for obtaining routing tables at each node.
6. Implement data encryption and data decryption
7. Write a program for congestion control using Leaky bucket algorithm.
8. Write a program for frame sorting technique used in buffers.
9. Programs using Wireshark

i. Packet Capture Using Wire shark
ii. Starting Wire shark
iii. Viewing Captured Traffic
iv. Analysis and Statistics & Filters.

10. How to run Nmap scan
11. Operating System Detection using Nmap
12. Do the following using NS2 Simulator
    i. NS2 Simulator-Introduction
    ii. Simulate to Find the Number of Packets Dropped
    iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
    iv. Simulate to Find the Number of Packets Dropped due to Congestion
    v. Simulate to Compare Data Rate& Throughput.
    vi. Simulate to Plot Congestion for Different Source/Destination
    vii. Simulate to Determine the Performance with respect to transmission of Packets

TEXTBOOKS

1. Andrew S.Tanenbaum, David j.wetherall, Computer Networks, 6th Edition, PEARSON.
2. James F.Kurose, Keith W. Ross, Computer Networking: A Top-Down 6th edition, Pearson, 2019. 2. Computer Networks: A Systems Approach-Bruce Davie, VMware-Larry Peterson, Princeton University-2019.

REFERENCES BOOKS:

1. Shivendra S. Panwar, Shiwen Mao, Jeong-Dong Ryoo, and Yihan Li, *TCP/IP Essentials: A Lab-Based Approach*, Cambridge University Press, 2004.
2. Cisco Networking Academy, *CCNA1 and CCNA2 Companion Guide*, 3rd Edition, Cisco Networking Academy Program, 2003.
3. Elliotte Rusty Harold, *Java Network Programming*, 3rd Edition, O'Reilly Media, 2011.

ONLINE LEARNING RESOURCES/VIRTUAL LABS:

1. https://www.netacad.com/courses/packet-tracer-
2. https://www.wireshark.org/docs/wsug_html_chunked/
3. https://nptel.ac.in/courses/106105183/25
4. http://www.nptelvideos.in/2012/11/computer-networks.html
5. https://nptel.ac.in/courses/106105183/3
6. http://vlabs.iitb.ac.in/vlabs-dev/labs_local/computer-networks/labs/explist.php

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(23CS0551) FULL STACK DEVELOPMENT- II
(Skill Enhancement Course)

COURSE OBJECTIVES

The course is designed to

1. *Make use of Modern- day JavaScript with ES6 standards for designing Dynamic web pages*
2. *Building robust & responsive User Interfaces using popular JavaScript library* ***_React.js****'. Building robust backend APIs using* ***_Express. js****'*
3. *Establishing the connection between frontend (React) User interfaces and backend APIs (Express) with Data Bases(My SQL)*
4. *Familiarize students with GitHub for remote repository hosting and collaborative development*

COURSE OUT COMES:

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

1. *Building fast and interactive UIs*
2. *Applying Declarative approach for developing web apps*
3. *Understanding ES6 features to embrace modern JavaScript*
4. *Building reliable APIs with Express. Js*
5. *Integrate front-end and back-end components to create full-stack web applications.*
6. *Deploy full-stack applications with database integration and version control tools*

Experiments covering the Topics:

1. Introduction to DOM (Document Object Model), Ecma Script (ES6) standards and features like Arrow functions, Spread operator, Rest operator, Type coercion, Type hoisting, String literals, Array and Object Destructuring.
2. Basics of React. js like React Components, JSX, Conditional rendering Differences between Real DOM and Virtual DOM.
3. Important React.js concepts like React hooks, Props, React forms, Fetch API, Iterative rendering using JavaScript map() function.
4. JavaScript runtime environment node. js and its uses, Express. js and Routing, Micro-Services architecture and MVC architecture, database connectivity using (My SQL)

5. Introduction to My SQL, setting up MySQL and configuring, Databases, My SQL queries, subqueries, creating My SQL driver for database connectivity to Express. js server.
6. Introduction to Git and GitHub and upload project& team collaboration

Sample Experiments:

1. **Introduction to Modern JavaScript and DOM**
   a) Write a JavaScript program to link JavaScript file with the HTML page
   b) Write a JavaScript program to select the elements in HTML page using selectors
   c) Write a JavaScript program to implement the event listeners
   d) Write a JavaScript program to handle the click events for the HTML button elements
   e) Write a JavaScript program to With three types of functions
      i. Function declaration
      ii. Function definition
      iii. Arrow functions

2. **Basics of React. js**
   a) Write a React program to implement a counter button using react class components
   b) Write a React program to implement a counter button using react functional components
   c) Write a React program to handle the button click events in functional component
   d) Write a React program to conditionally render a component in the browser
   e) Write a React program to display text using String literals

3. **Important concepts of React. js**
   a) Write a React program to implement a counter button using React use State hook
   b) Write a React program to fetch the data from an API using React use Effect hook
   c) Write a React program with two react components sharing data using Props.
   d) Write a React program to implement the forms in react
   e) Write a React program to implement the iterative rendering using map() function.

4. **Introduction to Git and GitHub**
   a. Setup
      o Install Git on local machine.

- Configure Git (user name, email).
- Create GitHub account and generate a personal access token.

b. Basic Git Workflow

- Create a local repository using git init
- Create and add files → git add .
- Commit files → git commit -m "Initial commit"
- Connect to GitHub remote → git remote add origin <repo_url>
- Push to GitHub → git push -u origin main

c. Branching and Collaboration

- Create a branch → git checkout -b feature1
- Merge branch to main → git merge feature1
- Resolve merge conflicts (guided)

5. Upload React Project to GitHub

- Create a new React app using npx create-react-app myapp
- Initialize a git repo and push to GitHub
- Use .gitignore to exclude node_modules
- Create multiple branches: feature/navbar, feature/form
- Practice merge and pull requests (can use GitHub GUI)

6. Introduction to Node. js and Express. js

a. Write a program to implement the ‗hello world' message in the route through the browser using Express

b. Write a program to develop a small website with multiple routes using Express. js

c. Write a program to print the ‗hello world' in the browser console using Express. js

d. Write a program to implement the CRUD operations using Express. js

e. Write a program to establish the connection between API and Database using Express – My SQL driver

7. Introduction to My SQL

a. Write a program to create a Database and table inside that database using My SQL Command line client

b. Write a My SQL queries to create table, and insert the data, update the data in the table

c. Write a My SQL queries to implement the subqueries in the My SQL command line client

d. Write a My SQL program to create the script files in the My SQL workbench

e. Write a My SQL program to create a database directory in Project and initialize a database. sql file to integrate the database into API

8. **Team Collaboration Using GitHub**
    - Form groups of 2–3 students
    - Create a shared GitHub repo
    - Assign tasks and work in branches
    - Use Issues, Pull Requests, and Code Reviews
    - Document code with README.md

TEXT BOOKS:

1. Jon Duckett, *Web Design with HTML, CSS, JavaScript and jQuery*, Wiley. Nicholas C. Zakas, *Professional JavaScript for Web Developers*, Wiley.
2. John Dean, *Web Programming with HTML5, CSS, and JavaScript*, Jones & Bartlett Learning, 2019.
3. Vasan Subramanian, *Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node*, 2nd Edition, Apress (O'Reilly).
4. Robin Nixon, *Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites*, O'Reilly.
5. Azat Mardan, *Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB*, 2015.

REFERENCE BOOKS:

1. Eric Bush, *Full-Stack JavaScript Development*.
2. Robert W. Sebesta, *Programming the World Wide Web*, 7th Edition, Pearson, 2013.
3. Tomasz Dyl, Kamil Przeorski, and Maciej Czarnecki, *Mastering Full Stack React Web Development*, 2017.

ONLINE LEARNING RESOURCES:

1. https://ict.iitk.ac.in/product/full-stack-developer-html5-css3-js-bootstrap-php-4/
2. https://www.w3schools.com/html
3. https://www.w3schools.com/css
4. https://www.w3schools.com/js/
5. https://www.w3schools.com/nodejs
6. https://www.w3schools.com/typescript

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(23EC0417) Tinkering Lab
(Common to All Branches)

The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.

COURSE OBJECTIVES

The objectives of the course are to

1.Encourage Innovation and Creativity
2.Provide Hands-on Learning and Impart Skill Development
3.Foster Collaboration and Teamwork
4.Enable Interdisciplinary Learning, Prepare for Industry and Entrepreneurship
5.Impart Problem-Solving mind-set

These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start- ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.

COURSE OUTCOMES

The students will be able to experiment, innovate, and solve real-world challenges

List of experiments:

1) Make your own parallel and series circuits using breadboard for any application of your choice.
2) Design and 3D print a Walking Robot
3) Design and 3D Print a Rocket.
4) Temperature & Humidity Monitoring System (DHT11 + LCD)
5) Water Level Detection and Alert System
6) Automatic Plant Watering System
7) Bluetooth-Based Door Lock System
8) Smart Dustbin Using Ultrasonic Sensor
9) Fire Detection and Alarm System
10) RFID-Based Attendance System
11) Voice-Controlled Devices via Google Assistant
12) Heart Rate Monitoring Using Pulse Sensor
13) Soil Moisture-Based Irrigation
14) Smart Helmet for Accident Detection

15) Milk Adulteration Detection System
16) Water Purification via Activated Carbon
17) Solar Dehydrator for Food Drying
18) Temperature-Controlled Chemical Reactor
19) Ethanol Mini-Plant Using Biomass
20) Smart Fluid Flow Control (Solenoid + pH Sensor)
21) Portable Water Quality Tester
22) AI Crop Disease Detection
23) AI-based Smart Irrigation
24) ECG Signal Acquisition and Plotting
25) AI-Powered Traffic Flow Prediction
26) Smart Grid Simulation with Load Monitoring
27) Smart Campus Indoor Navigator
28) Weather Station Prototype
29) Firefighting Robot with Sensor Guidance
30) Facial Recognition Dustbin
31) Barcode-Based Lab Inventory System
32) Growth Chamber for Plants
33) Biomedical Waste Alert System
34) Soil Classification with AI
35) Smart Railway Gate
36) Smart Bin Locator via GPS and Load Sensors
37) Algae-Based Water Purifier
38) Contactless Attendance via Face Recognition

Note: The students can also design and implement their own ideas, apart from the list of experiments mentioned above.

Note: A minimum of 8 to 10 experiments must be completed by the students

Students need to refer to the following links:

1.https://aim.gov.in/pdf/equipment-manual-pdf.pdf
2.https://atl.aim.gov.in/ATL-Equipment-Manual/
3.https://aim.gov.in/pdf/Level-1.pdf
4.https://aim.gov.in/pdf/Level-2.pdf
5.https://aim.gov.in/pdf/Level-3.pdf

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III B.Tech - I Sem.

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(23CS0522) Evaluation of Community Service Internship

Mandatory Community Service Project / Internship of 08 weeks duration during summer vacation

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III B.Tech - II Sem.

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(23CS0523) MACHINE LEARNING

COURSE OBJECTIVES

The objectives of the course are

1. *Define machine learning and its different types (supervised and unsupervised) and understand their applications.*
2. *Apply supervised learning algorithms including decision trees and k-nearest neighbors (k-NN).*
3. *Implement unsupervised learning techniques, such as K-means clustering.*

COURSE OUTCOMES

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

1. *Identify machine learning techniques suitable for a given problem.*
2. *Solve real-world problems using various machine learning techniques.*
3. *Apply Dimensionality reduction techniques for data preprocessing.*
4. *Implement machine learning models using appropriate tools and frameworks to analyze and interpret data effectively.*
5. *Explain what is learning and why it is essential in the design of intelligent machines.*
6. *Evaluate Advanced learning models for language, vision, speech, decision making etc.*

UNIT-I:

Introduction to Machine Learning:

Evolution of Machine Learning, Paradigms for ML, Learning by Rote, Learning by Induction, Reinforcement Learning, Types of Data, Matching, Stages in Machine Learning, Data Acquisition, Feature Engineering, Data Representation, Model Selection, Model Learning, Model Evaluation, Model Prediction, Search and Learning, Data Sets.

UNIT-II:

Nearest Neighbor-Based Models:

Introduction to Proximity Measures, Distance Measures, Non-Metric Similarity Functions, Proximity Between Binary Patterns, Different Classification Algorithms Based on the Distance Measures ,K-Nearest Neighbor Classifier, Radius Distance Nearest Neighbor Algorithm, KNN Regression, Performance of Classifiers, Performance of Regression Algorithms**.**

UNIT-III:

Models Based on Decision Trees:

Decision Trees for Classification, Impurity Measures, Properties, Regression Based on Decision Trees, Bias–Variance Trade-off, Random Forests for Classification and Regression.

The Bayes Classifier: Introduction to the Bayes Classifier, Bayes‘ Rule and Inference, The Bayes Classifier and its Optimality, Multi-Class Classification | Class Conditional Independence and Naive Bayes Classifier (NBC)

UNIT-IV:

Linear Discriminants for Machine Learning:

Introduction to Linear Discriminants, Linear Discriminants for Classification, Perceptron Classifier, Perceptron Learning Algorithm, Support Vector Machines, Linearly Non-Separable Case, Non-linear SVM, Kernel Trick, Logistic Regression, Linear Regression, Multi-Layer Perceptrons (MLPs), Backpropagation for Training an MLP.

UNIT-V:

Clustering :

Introduction to Clustering, Partitioning of Data, Matrix Factorization | Clustering of Patterns, Divisive Clustering, Agglomerative Clustering, Partitional Clustering, K-Means Clustering, Soft Partitioning, Soft Clustering, Fuzzy C-Means Clustering, Rough Clustering, Rough K-Means Clustering Algorithm, Expectation Maximization-Based Clustering, Spectral Clustering.

TEXTBOOK:

1. M. N. Murthy and V. S. Ananthanarayana, *Machine Learning Theory and Practice*, Universities Press (India), 2024

REFERENCE BOOKS:

1. Tom M. Mitchell, *Machine Learning*, McGraw-Hill Publication, 2017.
2. Peter Harrington, *Machine Learning in Action*, DreamTech.
3. Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, *Introduction to Data Mining*, 7th Edition, 2019.

Online Learning Resources:

1. Coursera,Machine Learning by Andrew Ng (Stanford University)
2. Scikit-learn Documentation
3. Kaggle Learn,Machine Learning
4. Google‘s Machine Learning Crash Course

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III B.Tech - II Sem.

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(23CS0524) CLOUD COMPUTING
(Common to CSE, CAD, CIA, CIC)

COURSE OBJECTIVE

The course is designed to

1. *To explain the evolving computer model called cloud computing.*
2. *To introduce the various levels of services that can be achieved by cloud.*
3. *To describe the security as pects in cloud.*

COURSE OUTCOMES:

After completion of the course, students will be able to

1. *Ability to create cloud computing environment*
2. *Ability to design applications for Cloud environment*
3. *Design & develop back up strategies for cloud data based on features.*
4. *Explore emerging trends and technologies in cloud computing such as serverless architecture, edge computing*
5. *Use and Examine different cloud computing services.*
6. *Apply different cloud programming model as perneed.*

UNIT-I :

Basics of Cloud computing

Introduction to cloud computing: Introduction, Character is tics of cloud computing, Cloud Models, Cloud Services Examples, Cloud Based services and applications

Cloud concepts and Technologies: Virtualization, Load balancing, Scalability and Elasticity, Deployment, Replication, Monitoring, Software defined, Network function virtualization, Map Reduce, Identity and Access Management, services level Agreements, Billing.

Cloud Services and Plat forms: Compute Services, Storage Services, Data, base Services, Application services, Content delivery services Analytics Services, Deployment and Management Services, Identity and Access Management services, Open Source Private Cloud software.

UNIT- II:

Hadoop and Python

Hadoop Map Reduce: Apache Hadoop, Hadoop Map Reduce Job Execution, Hadoop Schedulers, Hadoop Clusterset up.

Cloud Application Design: Reference Architecture for Cloud Applications, Cloud Application Design Methodologies, Data Storage Approaches.

Python Basics: Introduction, Installing Python, Python data Types & Data Structures,Controlflow,Function,Modules,Packages,Filehandling,Date/TimeOperations,Classes.

UNIT - III :

Python for Cloud computing

Python for Cloud: Python for Amazon web services, Python for Google Cloud Platform, Python for windows Azure, Python for Map Reduce, Python packages of Interest, Python web Application Frame work, Designing a REST ful web API.

Cloud Application Developmentin Python: Design Approaches, Image Processing APP, Document Storage App, Map Reduce App, Social Media Analytics App.

UNIT - IV :

Big data, multimedia and Tuning

Big Data Analytics: Introduction, Clustering Big Data, Classification of Big data Recommendation of Systems.

Multimedia Cloud: Introduction, Case Study: Live video Streaming App, Streaming Protocols, case Study: Video Trans coding App.

Cloud Application Bench marking and Tuning: Introduction, Work load Character is tics, Application Performance Metrics, Design Considerations for a Bench marking Methodology, Bench marking Tools, Deployment Prototyping, Load Testing & Bottleneck Detection case Study, Hadoop bench marking case Study.

UNIT - V :

Applications and Issues in Cloud

Cloud Security: Introduction, CSA Cloud Security Architecture, Authentication, Authorization, Identity Access Management, Data Security, Key Management, Auditing.

Cloud for Industry, Health care & Education: Cloud Computing for Health care, Cloud computing for Energy Systems, Cloud Computing for Transportation Systems, Cloud Computing for Manufacturing Industry, Cloud computing for Education.

Migrating in to a Cloud: Introduction, Broad Approaches to migrating into the cloud, the seven–step model of migration in to a cloud.

Organizational readiness and Change Management in The Cloud Age: Introduction, Basic concepts of Organizational Readiness, Drivers for changes: A frame work to comprehend the competitive environment, common change management models, change management maturity models, Organizational readiness self– assessment.

Legal Issues in Cloud Computing: Introduction, Data Privacy and security Issues, cloud contracting models, Jurisdictional issues raised by virtualization and at a location, commercial and business considerations, Special Topics.

TEXT BOOKS:

1. Arshdeep Bahga and Vijay Madisetti, *Cloud Computing: A Hands-On Approach*, Universities Press, 2016.
2. Rajkumar Buyya, James Broberg, and Andrzej Goscinski, *Cloud Computing: Principles and Paradigms*, Wiley, 2016.

REFERENCE BOOKS:

1. Rajkumar Buyya, Christian Vecchiola, and S. Thamarai Selvi, *Mastering Cloud Computing*, Tata McGraw Hill.
2. Arshdeep Bahga and Vijay Madisetti, *Cloud Computing: A Hands-On Approach*.
3. Anthony T. Velte, Toby J. Velte, and Robert Elsenpeter, *Cloud Computing: A Practical Approach*, Tata McGraw Hill, Reprint 2011.
4. Gautam Shroff, *Enterprise Cloud Computing*, Cambridge University Press, 2010.
5. George Reese, *Cloud Application Architectures: Building Applications and Infrastructure in the Cloud*, O'Reilly, SPD, Reprint 2011.
6. K. Chandrasekaran, *Essentials of Cloud Computing*, CRC Press.

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III B.Tech - II Sem.

(23CS0525) CRYPTOGRAPHY & NETWORK SECURITY
(Common to CSE and CAD)

COURSE OBJECTIVES

The course is designed to

1. *The concepts of classical encryption techniques and concepts of finite fields and number theory*
2. *Working principles and utilities of various crypto graphic algorithms including secret key crypto graphy, hashes, and message digests, and public key algorithms*
3. *Design issues and working principles of various authentication protocols, PKI standards*
4. *Various secure communication standards including Kerberos, I Psec, TLS and email*
5. *Concepts of crypto graphic utilities and authentication mechanisms to design secure applications*

COURSE OUT COMES:

After completion of the course, students will be able to

1. *Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts off in it fields and number theory*
2. *Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication*
3. *Apply the knowledge of crypto graphic check sums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.*
4. *Demonstrate the ability to apply user authentication principles including Kerberos for secure authentication*
5. *Gain proficiency in securing web communications using TLS and HTTPS, manage secure remote access with SSH, and design firewall policies*
6. *Analyze and implement intrusion detection systems and network security protocols to defend against cyber attacks and threats.*

UNIT-I

Computer and Network Security Concepts:

Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Classical Encryption Techniques: Sym metric Cip her Model, Substitution Techniques, Transposition Techniques, Steganography, Block Ciphers: Traditional Block Cipher Structure, The Data Encryption Standard, Advanced Encryption Standard: AES Structure, AES Transformation Functions.

UNIT II

Number Theory:

The Euclidean Algorithm, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder Theorem, Discrete Logarithms, Finite Fields: Finite Fields of the Form GF(p), Finite Fields of the Form GF(2^n) .

Public Key Cryptography: Principles, Public Key Cryptography Algorithms, RSA Algorithm, Diffie Hellman Key Exchange, Elliptic Curve Cryptography.

UNIT-III

Cryptographic Hash Functions:

Application of Cryp to graphic Hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC &CMAC. **Digital Signatures**: NIST Digital Signature Algorithm, Distribution of Public Keys,
X.509 Certificates, Public- Key Infrastructure

UNITIV

User Authentication:

Remote User Authentication Principles, Kerberos. Electronic Mail Security: Pretty Good Privacy (PGP) And S/MIME.

IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange.

UNIT V

Transport Level Security:

Web Security Requirements, Transport Layer Security (TLS), HTTPS, Secure Shell (SSH)

Fire walls: Fire wall Character is tics and Access Policy, Types of Fire walls, Fire wall Location and Configurations.

TEXT BOOKS:

1. William Stallings, *Cryptography and Network Security*, 8th Edition, Pearson Education.
2. Bernard Menezes, *Cryptography, Network Security and Cyber Laws*, Cengage Learning, 2010.

REFERENCE BOOKS:

1. Behrouz A. Forouzan and Debdeep Mukhopadhyay, *Cryptography and Network Security*, 3rd Edition, McGraw Hill, 2015.
2. Jason Albanese and Wes Sonnenreich, *Network Security Illustrated*, McGraw Hill, 2003

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ONLINE LEARNING RESOURCES:

1. https://nptel.ac.in/courses/106/105/106105031/lecture
2. https://nptel.ac.in/courses/106/105/106105162/lecturebyDr.SouravMukhopadhyayIIT Kharagpur[VideoLecture]
3. https://www.mitel.com/articles/web-communication-cryptography-and-network- security web articles by Mitel Power Connections

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(23CS0535) SOFTWARE TESTING METHODOLOGIES
(Common to CSE, CAD and CCC)
(Professional Elective Course –II)

COURSE OBJECTIVES

The course is designed to

1. *To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods.*
2. *To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing.*
3. *It also helps to learn the types of bugs, testing levels with which the student can very well identify a bug and correct as when it happens.*
4. *It provides knowledge on transaction flow testing and data flow testing techniques so that the flow of the program is tested as well.*
5. *To learn the domain testing, path testing and logic based testing to explore the testing process easier.*

COURSE OUTCOMES

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

1. *Know the basic concepts of software testing and its essentials.*
2. *Able to identify the various bugs and correcting them after knowing the consequences of the bug.*
3. *Apply control flow-based structural models to design and perform software testing effectively.*
4. *Apply automated testing tools and techniques to evaluate software quality and reliability in real-time scenarios.*
5. *Use of program's control flow as a structural model is the corner stone of testing.*
6. *Performing functional testing using control flow and transaction flow graphs.*

UNIT-I

Introduction:-Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs, Flow graphs and Path testing:- Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II

Transaction Flow Testing:-transaction flows, transaction flow testing techniques. Dataflow

testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT-III

Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT-IV

Paths, Path products and Regular expressions:- path products &path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing:-over view, decision tables, path expressions, kv charts, specifications.

UNIT-V

State, State Graphs and Transition testing:- state graphs, good & bad state graphs, state testing, Testability tips. Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools

TEXT BOOKS

1. Boris Beizer, *Software Testing Techniques*, 2nd Edition, Dreamtech Press.
2. Dr. K.V.K.K. Prasad, *Software Testing Tools*, Dreamtech Press.

REFERENCES BOOKS::

1. Brian Marick, *The Craft of Software Testing*, Pearson Education.
2. *Software Testing Techniques*, SPD (O'Reilly).
3. Edward Kit, *Software Testing in the Real World*, Pearson Education.
4. William E. Perry, *Effective Methods of Software Testing*, John Wiley & Sons.
5. Glenford J. Myers, *The Art of Software Testing*, John Wiley & Sons.

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(23CS0536) CYBER SECURITY
(Professional Elective course –II)

COURSE OBJECTIVES

The course is designed to provide awareness on different cyber crimes, cyber offenses, tools and methods used in cybercrime.

COURSE OUTCOMES

After completion of the course, students will be able to

1. *Classify the cybercrimes and understand the Indian ITA 2000*
2. *Analyze the vulnerabilities in any computing system and find the solutions*
3. *Predict the security threats of the future*
4. *Investigate the protection mechanism*
5. *Design security solutions for organizations*
6. *Develop and implement incident response strategies to mitigate cyber-attacks*

UNIT I :

Introduction to Cybercrime

Introduction, Cybercrime, and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, And Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT II :

Cyber Offenses: How Criminals Plan Them

Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing

UNIT III :

Cybercrime: Mobile and Wireless Devices

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

UNIT IV :

Tools and Methods Used in Cybercrime

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares,Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT V : Cyber Security: Organizational Implications

Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

TEXT BOOKS:

1. Nina Godbole and Sunil Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Wiley India.
2. William Stallings, *Effective Cybersecurity: A Guide to Using Best Practices and Standards*, Pearson Education, 2018.

REFERENCE BOOKS:

1. James Graham, Richard Howard, and Ryan Otson, *Cyber Security Essentials*, CRC Press.
2. Chwan-Hwa (John) Wu and J. David Irwin, *Introduction to Cyber Security*, CRC Press, Taylor & Francis Group.

ONLINE LEARNING RESOURCES:

1. http://nptel.ac.in/courses/106105031/40
2. http://nptel.ac.in/courses/106105031/39
3. http://nptel.ac.in/courses/106105031/38

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IV B.Tech – I Sem.

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(23CI0608) EXTENDED REALITY SYSTEMS
(Professional Elective course (PEC) –II)

COURSE OBJECTIVE:

The primary objective of this course is to introduce students to the foundational principles and technologies of Virtual Reality (VR) and Augmented Reality (AR), along with the key devices, modeling techniques, and interaction mechanisms involved in creating immersive environments. The course will cover the essentials of VR and AR, including hardware, software, and human perception, as well as advanced concepts such as 3D modeling, interaction design, and audio rendering. Students will gain hands-on experience in the use of VR/AR systems and explore the challenges and methodologies for building interactive virtual environments.

COURSE OUTCOMES:

At the end of the Course the student will be able to:

1. *Understand the core concepts of Virtual Reality and Augmented Reality, and their differences.*
2. *Learn about the hardware and software components required for VR and AR systems, as well as the impact of human physiology and perception on the virtual experience.*
3. *Gain knowledge of input devices (trackers, navigation, and gesture interfaces) and output devices (graphics, sound displays, and haptic feedback).*
4. *Develop skills in modeling techniques, including geometric, kinematics, physical, and behavior modeling for VR and AR environments.*
5. *Explore the technologies and methodologies used to create Augmented Reality systems, including marker-based AR and AR software development.*
6. *Design and evaluate immersive VR/AR applications for real-world domains such as education, healthcare, entertainment, and simulation*

UNIT – I

INTRODUCTION TO VIRTUAL REALITY (VR): Defining Virtual Reality, Key elements of virtual reality experience, Virtual Reality, Telepresence, Augmented Reality and Cyberspace. **Bird's-Eye View:** Hardware, Software, Human Physiology and Perception.

UNIT-II

Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces**.**

Output Devices: Graphics displays, sound displays & haptic feedback.

UNIT-III

Modeling: Geometric modeling, Kinematics modeling, Physical modeling, Behaviour modeling, Model management.

UNIT-IV

Augmented Reality (AR): Taxonomy, Technology and Features of Augmented Reality,

AR Vs VR, Challenges with AR, AR systems and functionality, Augmented Reality Methods, Visualization Techniques for Augmented Reality, Enhancing interactivity in AR Environments, Evaluating AR systems

AR software development : AR software, Camera parameters and camera calibration, Marker-based augmented reality, AR Toolkit.

UNIT-V *(10 Lectures)*

Interaction & Audio:

Interaction - Motor Programs and Remapping, Locomotion, Manipulation, Social Interaction. Audio -The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering.

Interaction - Motor Programs and Remapping, Locomotion, Manipulation, Social Interaction. Audio -The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering. (from Text Book2)

TEXT BOOKS:

1. Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc, 2017.
2. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016.

REFERENCES:

1. RajeshK.Maurya,*Computer Graphics with Virtual Reality System*, 3rd Edition, Wiley Publication, 2018.
2. William R. Sherman and Alan B. Craig, *Understanding Virtual Reality Interface, Application, and Design*, 2nd Edition, Morgan Kaufmann Publishers, Elsevier, 2019.
3. GrigoreC.Burdea,PhilippeCoiffet,*Virtual Reality Technology*, 2nd Edition, Wiley,2017.
4. K.S. Hale and K. M. Stanney, *Handbook on Virtual Environments*, 2nd Edition, CRC Press, 2015.

WEB REFERENCES:

1. http://vr.cs.uiuc.edu/vrbook.pdf
2. https://nptel.ac.in/courses/106/106/106106138/

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III B.Tech - II Sem.

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(23CS0537) DevOps
(Professional Elective course–II)

COURSE OBJECTIVES
The course is designed to

1. *Understand collaboration and productivity by automating infrastructure and workflows*
2. *Familiarize with continuous measuring applications performance*

COURSE OUTCOMES

After completion of the course, students will be able to

1. *Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service alibi*
2. *Describe Dev Ops &Dev Sec Ops methodologies and their key concepts*
3. *Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models*
4. *Set up complete private infrastructure using version control systems and CI/CD tools*
5. *Apply DevOps tools to automate the software development lifecycle from code integration to deployment.*
6. *Implement end-to-end DevOps lifecycle by integrating automated testing, containerization, and deployment in real-time scenarios*

UNIT I
Dev Ops: An Overview, Dev Ops: Origins, Dev Ops: Roots, Dev Ops: Practices Dev OpsCulture.
Adopting Dev Ops: Developing the Playbook. Developing a Business Case for a Dev Ops: Developing the Business Case

UNIT II
Completing the Business Model Canvas, Customer Segments, Value Segments, Value Propositions, Channels, Customer Relationships, Revenue Streams, Key Resources, Key Activities, Key Partnerships, Cost Structures. Dev Ops Plays for Optimizing the delivery Pipeline: Dev Ops as an optimization Exercise, Core Themes, The Dev Ops Plays, Specializing Core Plays

UNIT III
Dev Ops Plays for Driving Innovation: Optimize to Innovate, The Uber Syndrome, Innovation and the Role of Technology, Core Themes, play: Build a Dev Ops Platform, play: Deliver Micro services Architectures, play: DevOps an API Economy, play: Organizing for Innovation.

UNIT IV
Scaling Dev Ops for the Enterprise: Core Themes, play: DevOps Center of Competency, play:

Developing Culture of Innovation at Scale, play: Developing a Culture of continuous Improvement, play: Team Models for DevOps, play: Standardization of Tools and Process, play: Security Considerations for DevOps, Play: DevOps and Outsourcing.

UNIT V

Leading Dev Ops Adoption in the Enterprise: Play: Dev Ops as a transformation Exercise, play: Developing a Culture of Collaboration and Trust, play: Dev Ops Thinking for the Line of Business, play: starting with Pilot Projects, Play: Rearing Unicorns on an Aircrafts Carrier. Appendix Case Study: Example Dev Ops Adoption Roadmap Organization Background, Roadmap Structure, Adoption Roadmap.

TEXT BOOKS:

1. Sanjeev Sharma, *The DevOps Adoption Playbook*, John Wiley & Sons, Inc., 2017.
2. Sanjeev Sharma & Bernie Coyne, *DevOps for Dummies*, John Wiley & Sons, Inc.

REFERENCE BOOKS:

1. Gene Kim, Jez Humble, Patrick Debois, and John Willis, *The DevOps Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations*, IT Revolution Press, 2016.
2. Michael Huttermann, *DevOps for Developers*, Apress, 2012.

ONLINE LEARNING RESOURCES:

Learning DevOps with Terra form Infrastructure Automation Course Udemy

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III B.Tech - II Sem.

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(23EC0451) EMBEDDED SYSTEMS DESIGN
(Professional Elective Course –II)

COURSE OBJECTIVES

The course is designed to

1. *To understand the history, classification, and design process of embedded systems.*
2. *To explore the core components of embedded systems, including processors, memory, and I/O components.*
3. *To introduce onboard and external communication interfaces used in embedded systems.*
4. *To explain different firmware design approaches and programming techniques for embedded systems.*
5. *To provide an understanding of real-time operating systems and task management in embedded systems.*

COURSE OUTCOMES

After completing the course, the student will be able to,

1. *Classify embedded systems based on their purpose, generation, and complexity.*
2. *Identify and select appropriate hardware components for an embedded system design.*
3. *Differentiate and implement various communication protocols like I2C, SPI, and CAN.*
4. *Develop firmware using assembly and high-level programming languages.*
5. *Analyze and apply RTOS-based task scheduling and synchronization techniques.*
6. *Integrate hardware and software components to build and test real-time embedded applications.*

UNIT- I

Introduction to Embedded Systems

History of embedded systems, Classification of embedded systems based on generation and complexity, Purpose of embedded systems, The embedded system design process-requirements, specification, architecture design, designing hardware and software, components, system integration, Applications of embedded systems, and characteristics of embedded systems.

UNIT- II

Typical Embedded System

Core of the embedded system-general purpose and domain specific processors, ASICs, PLDs, COTs; Memory-ROM, RAM, memory according to the type of interface, memory shadowing, memory selection for embedded systems, Sensors, actuators, I/O components: seven segment LED, relay, piezo buzzer, push button switch, other sub-systems: reset circuit, brownout protection circuit, oscillator circuit real time clock, watch dog timer.

UNIT- III

Communication Interface

Onboard communication interfaces-I2C, SPI, CAN, parallel interface; External communication interfaces-RS232 and RS485, USB, infrared, Bluetooth, Wi-Fi, ZigBe, GPRS, GSM.

UNIT- IV

Embedded Firmware Design and Development

Embedded firmware design approaches-super loop based approach, operating system based approach; embedded firmware development languages-assembly language based development, high level language based development.

UNIT-V

RTOS based Embedded System Design

Operating system basics, types of operating systems, tasks, process and threads, multiprocessing and multitasking, task scheduling: non-pre-emptive and pre-emptive scheduling; task communication- shared memory, message passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/ Synchronization Issues, Task Synchronization Techniques

TEXT BOOKS:

1.Shibu K.V., *Introduction to Embedded Systems*, McGraw Hill Education.
2.Wayne Wolf, *Computers as Components*, 2nd Edition, Morgan Kaufmann.

REFERENCES BOOKS:

1. Frank Vahid, Tony Givargis, *Embedded System Design*, John Wiley.
2. Lyla B. Das, *Embedded Systems: An Integrated Approach*, Pearson Education, 2012.
3. Raj Kamal, *Embedded Systems*, Tata McGraw-Hill.

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(23CS0538) SOFTWARE PROJECT MANAGEMENT
(Professional Elective course –III)
(Common to CSE, CAD, CCC and CIC)

COURSE OBJECTIVE:

This course is designed to enable the students to understand the fundamental principles of Software Project management & will also have a good knowledge of the responsibilities of a project manager and how to handle them.

COURSE OUT COMES:

After completion of the course, students will be able to

1. *Describe the fundamentals of Project Management*
2. *Recognize and use Project Scheduling Techniques*
3. *Familiarize with Project Control Mechanisms*
4. *Understand Team Management*
5. *Recognize the importance of Project Documentation and Evaluation*
6. *Evaluate software project success factors and best practices through case studies*

UNIT-I

Conventional Software Management:

The water fall model, conventional software Management performance Evolution of Software Economics: software Economics. Pragmatic Software Cost Estimation Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality ,Peer Inspections.

UNIT-II

The old way and the new:

The principles of convention al software Engineering, principles of modern software management, transitioning to aniter ative process.

Lifecycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts

UNIT-III

Work Flows of the process:

Software process work flows, Inter Trans work flows.Check points of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. Iterative Process Planning: work break down structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic

planning

UNIT-IV

Process Automation:

Automation Building Blocks, The Project Environment. Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators Tailoring the Process: Process discriminants. Managing people and organizing teams.

UNIT-V

Project Organizations and Responsibilities:

Line - of-Business Organizations, Project Organizations, evolution of Organizations.

Future Software Project Management: modern Project Profiles, Next generation Software economics, modern process stransitions.

Case Study: The Command Center Processing and Display System-Replacement(CCPDS-R)

TEXT BOOKS:

1. Walker Royce, *Software Project Management*, Pearson Education, 2012.
2. Bob Hughes, Mike Cotterell, and Rajib Mall, *Software Project Management*, 6th Edition, McGraw Hill, 2017.

REFERENCE BOOKS:

1. Pankaj Jalote, *Software Project Management in Practice*, 5th Edition, Pearson Education, 2017.
2. Murali K. Chemuturi and Thomas M. Cagley Jr., *Mastering Software Project Management: Best Practices, Tools and Techniques*, J. Ross Publishing, 2010.
3. Sanjay Mohapatra, *Software Project Management*, Cengage Learning, 2011.

ONLINE LEARNING RESOURCES:

1. http://nptel.ac.in/courses/106101061/29

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(23CS0539) MOBILE ADHOC NETWORKS

(Professional Elective course –III)

(Common to CSE, CCC, CIC)

COURSE OBJECTIVE:

The course is designed to

1. *Knowledge of mobile ad hoc networks, design and implementation issues, and available solutions.*
2. *Knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand, and hybrid.*
3. *Knowledge of clustering mechanisms and the different schemes that have been employed, e.g., hierarchical, flat, and leaderless.*
4. *Knowledge of the 802.11 Wireless Lan (WiFi) and Bluetooth standards.*

COURSE OUTCOMES

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

1. *Describe the unique issues in ad-hoc/sensor networks.*
2. *Describe current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks.*
3. *Discuss the challenges in designing MAC, routing and transport protocols for wireless ad- hoc/sensor networks.*
4. *Discuss the challenges in designing routing and transport protocols for wireless Adhoc/sensor networks.*
5. *Comprehend the various sensor network Platforms, tools and applications*
6. *Analyze the performance of ad-hoc and sensor network protocols using simulation tools.*

UNIT- I

Introduction to Ad Hoc Networks:

Characteristics of MANETs, Applications of MANETs and challenges of MANETs -Routing in MANETs: Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms, Other routing algorithms.

UNIT -II

Data Transmission:

Broadcast storm problem, Broadcasting, Multicasting and Geocasting -TC Pover Ad Hoc: TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT- III

Basics of Wireless, Sensors and Applications:

Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

UNIT- IV

Data Retrieval in Sensor Networks:

Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots-Security: Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

UNIT- V

Sensor Network Platforms and Tools:

Sensor Network Hardware, Berkeley motes,Sensor Network Programming Challenges, Node-Level Software Platforms -Operating System: Tiny OS -Imperative Language: nesC, Data flow style language: Tiny GALS, Node Level Simulators, ns- 2 and its sensor network extension.

TEXT BOOKS:

1. Carlos Corderio and Dharma P. Aggarwal, *Ad Hoc and Sensor Networks,Theory and Applications*, World Scientific Publications, March 2006, ISBN: 981-256-681-3.
2. Feng Zhao and Leonidas Guibas, *Wireless Sensor Networks: An Information Processing Approach*, Elsevier Science (Morgan Kaufmann), ISBN: 978-1-55860-914-3.

REFERENCE BOOKS:

1. C. Siva Ram Murthy and B. S. Manoj, *Ad Hoc Wireless Networks: Architectures and Protocols*, Pearson Education, 2008.
2. Charles E. Perkins, *Ad Hoc Networking*, Addison Wesley, 2001.
3. Mohammad Ilyas, *The Handbook of Ad Hoc Wireless Networks*, CRC Press, 2002.
4. Toh C. K., *Ad Hoc Mobile Wireless Networks: Protocols and Systems*, Prentice Hall PTR, 2002.
5. Raghavendra V. Kulkarni and Ganesh Kumar Venayagamoorthy, *Bio-Inspired Algorithms for Autonomous Mobile Ad Hoc Networks*, IEEE Press/Wiley, 2013.

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(23CS0540) NATURAL LANGUAGE PROCESSING
(Professional Elective course –III)

(Common to CSE, CIA, CCC, CIC)

COURSE OBJECTIVE

The course is designed to

1. *Explain and apply fundamental algorithms and techniques in the area of natural language processing(NLP)*
2. *Discuss approaches to syn tax and semantics in NLP.*
3. *Examine current methods for statistical approach esto machine translation.*
4. *Teach machine learning techniques used in NLP.*
5. *To provide insights into the challenges of multilingual NLP and ethical concerns*

COURSE OUT COMES:

After completion of the course, students will be able to

1. *Understand the various NLP Applications and Organization of Natural language, able to learn and implement realistic applications using Python.*
2. *Apply the various Parsing techniques, Bayes Rule, Shannongame, Entropy and Cross Entropy.*
3. *Understand the fundamentals of CFG and parsers and mechan is msin ATN's.*
4. *Apply Semantic Interpretation and Language Modelling.*
5. *Apply the concept of Machine Translation and multilingual Information Retrieval systems and Automatic Summarization.*
6. *Use NLP tools and libraries to analyze and interpret natural language data in real-world scenarios.*

UNIT- I

Introduction to Natural language

The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural language Under standing Systems, Linguistic Back ground: Anoutline of English Syn tax.

UNIT- II

Grammars and Parsing

Grammars and Parsing,Top,Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphologica l Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayees Rule, Shannongame, Entropy and Cross Entropy.

UNIT- III

Grammars for Natural Language

Grammars for Natural Language, Movement Phenomenonin Language, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

UNIT-IV

Semantic Interpretation

Semantic & Logical form, Word senses & ambiguity, The basic logical form language, Encoding ambiguity in the logical Form, Verbs & States in logical form, The maticroles, Speech acts & embedded sentences, Defining semantics structure model theory.

Language Modelling

Introduction- Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language Specific Modelling Problems, Multilingual and Crosslingual Language Modelling.

UNIT-V

Machine Translation

Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches ,Current Status .Anusarakaor Language Accessor: Background, Cutting the GordianKnot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Givingup Agreementin Anusarsaka Output, Language Bridges.

Multilingual Information Retrieval

Introduction, Document Pre-processing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources.

Multilingual Automatic Summarization

Introduction, Approach esto Summarization, Evaluation, How to Builda Summarizer, Competitions and Datasets.

TEXT BOOKS:

1. James Allen, *Natural Language Understanding*, 2nd Edition, Pearson Education, 2003.
2. Daniel M. Bikel and Imed Zitouni, *Multilingual Natural Language Processing Applications: From Theory to Practice*, Pearson Publications.
3. Akshar Bharathi and Vineet Chaitanya, *Natural Language Processing: A Paninian Perspective*, Prentice-Hall of India.

REFERENCE BOOKS:

1. Eugene Charniack, *Statistical Language Learning*, MIT Press, 1993.
2. Dan Jurafsky and James Martin, *Speech and Language Processing*, 2nd Edition, Prentice Hall, 2008.
3. Christopher Manning and Hinrich Schütze, *Foundations of Statistical Natural Language Processing*, MIT Press, 1999.

ONLINE LEARNING RESOURCES:

1. https://nptel.ac.in/courses/106/105/106105158/
2. http://www.nptelvideos.in/2012/11/natural-language- processing.html

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(23CS0541) DISTRIBUTED OPERATING SYSTEM
(Professional Elective Course –III)
(Common to CSE, CCC)

COURSE OBJECTIVES
The course is designed to

1. *To study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems)*
2. *Hardware and software features that support these systems.*

COURSE OUTCOMES

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

1. *Understand the design approaches of advanced operating systems*
2. *Analyze the design issues of distributed operating systems.*
3. *Evaluate design issues of multi-processor operating systems.*
4. *Identify the requirements Distributed File System and Distributed Shared Memory.*
5. *Formulate the solutions to schedule the real time applications.*
6. *Apply fault tolerance and recovery techniques to ensure reliability in distributed systems.*

UNIT - I

Architectures of Distributed Systems:

System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems, Communication Primitives. Theoretical Foundations: Inherent Limitations of a Distributed System, Lam port‘s Logical Clocks, Vector Clocks, Causal Ordering of Messages, Termination Detection.

UNIT - II

Distributed Mutual Exclusion:

The Classification of Mutual Exclusion Algorithms, Non-Token –Based Algorithms: Lamport‘s Algorithm, The Ricart-Agrawalsa Algorithm, Maekawa‘s Algorithm,Token- Based Algorithms: Suzuki-Kasami‘s Broadcast Algorithm, Singhal‘s Heurisric Algorithm,Raymond‘s Heuristic Algorithm.

UNIT - III

Distributed Deadlock Detection:

Preliminaries, Deadlock Handling Strategies in Distributed Systems, Issues in Deadlock Detection and Resolution, Control Organizations for Distributed Deadlock Detection, Centralized-

Deadlock,Detection Algorithms, Distributed Deadlock Detection Algorithms, Hierarchical Deadlock Detection Algorithms

UNIT - IV

Multiprocessor System Architectures:

Introduction, Motivation for multiprocessor Systems, Basic Multiprocessor System Architectures Multi Processor Operating Systems: Introduction, Structures of Multiprocessor Operating Systems, Operating Design Issues, Threads, Process Synchronization, Processor Scheduling. Distributed File Systems: Architecture, Mechanisms for Building Distributed File Systems, Design Issues

UNIT - V

Distributed Scheduling:

Issues in Load Distributing, Components of a Load Distributed Algorithm, Stability, Load Distributing Algorithms, Requirements for Load Distributing, Task Migration, Issues in task Migration Distributed Shared Memory: Architecture and Motivation, Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues

TEXT BOOKS:

1. Mukesh Singhal and Niranjan G. Shivaratri, *Advanced Concepts in Operating Systems*, Tata McGraw-Hill, 2001.
2. Andrew S. Tanenbaum and Maarten Van Steen, *Distributed Systems*, 2nd Edition, Pearson Prentice Hall, 2007.

REFERENCE BOOKS:

1. Pradeep K. Sinha, *Distributed Operating Systems: Concepts and Design*, PHI Learning, 2007.
2. George Coulouris, Jean Dollimore, Tim Kindberg, and Gordon Blair, *Distributed Systems: Concepts and Design*, 5th Edition, Pearson Education, 2012.
3. Tanenbaum A. S., *Modern Operating Systems*, 4th Edition, Pearson, 2016.
4. Ajay D. Kshemkalyani and Mukesh Singhal, *Distributed Computing: Principles, Algorithms, and Systems*, Cambridge University Press, 2008.

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(23CE0152) DISASTER MANAGEMENT
(Open Elective course –II)

COURSE OBJECTIVES

The course is designed to

1. *Understand the fundamental concepts of natural disasters, their occurrence, and disaster risk reduction strategies.*
2. *Analyze the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction.*
3. *Apply wind engineering principles and computational techniques in designing wind-resisting structures.*
4. *Evaluate earthquake effects on buildings and develop strategies for seismic retrofitting.*
5. *Assess seismic safety planning, design considerations, and innovative construction materials for disaster-resistant structures.*

COURSE OUTCOMES (COs)

Upon successful completion of this course, students will be able to:

1. *Examine types and patterns of natural disasters, interpret hazard maps, and evaluate disaster risk reduction and recovery measures.*
2. *Analyze the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction.*
3. *Apply wind engineering principles in the design of wind–resistant structures.*
4. *Apply computational techniques for the analysis and design of wind–resistant structures.*
5. *Evaluate earthquake effects on buildings and develop strategies for seismic retrofitting.*
6. *Design disaster-resistant structures with innovative construction materials.*

UNIT -I

Introduction to Natural Disasters:

Introduction to Natural Disasters– Brief Introduction to Different Types of Natural Disasters, Occurrence of Disasters in Different Climatic and Geographical Regions, Hazard Maps (Earthquake and Cyclone) of The World and India, Regulations for Disaster Risk Reduction, Post-Disaster Recovery and Rehabilitation (Socioeconomic Consequences).

UNIT -II

Cyclones and their Impact:

Cyclones and Their Impact– Climate Change and Its Impact On Tropical Cyclones, Nature of Cyclonic Wind, Velocities and Pressure, Cyclone Effects, Storm Surges, Floods, and Landslides. Behaviour of Structures in Past Cyclones and Windstorms, Case Studies - Cyclonic Retrofitting,

Strengthening of Structures, and Adaptive Sustainable Reconstruction. Life-Line Structures, Such as Temporary Cyclone Shelters

UNIT -III

Wind Engineering and Structural Response:

Wind Engineering and Structural Response– Basic Wind Engineering, Aerodynamics of Bluff Bodies, Vortex Shedding, and Associated Unsteadiness Along and Across Wind forces. Lab: Wind Tunnel Testing and Its Salient Features. Introduction to Computational Fluid Dynamics (CFD) - General Planning and Design Considerations Under Windstorms and Cyclones. Wind Effects on Buildings, Towers, Glass Panels, Etc., and Wind-Resistant Features in Design. Codal Provisions, Design Wind Speed, Pressure Coefficients. Coastal Zoning Regulations for Construction and Reconstruction in Coastal Areas - Innovative Construction Materials and Techniques, Traditional Construction Techniques in Coastal Areas

UNIT -IV

Seismology and Earthquake Effects:

Seismology and Earthquake Effects– Causes of Earthquakes, Plate Tectonics, Faults, Seismic Waves; Magnitude, Intensity, Epicentre, Energy Release, and Ground Motions. Earthquake Effects– On Ground, Soil Rupture, Liquefaction, Landslides - Performance of Ground and Buildings in Past Earthquakes– Behaviour of Various Types of Buildings and Structures, Collapse Patterns; Behaviour of Non-Structural Elements Such as Services, Fixtures, and Mountings,Case Studies - Seismic Retrofitting– Weakness in Existing Buildings, Aging, Concepts in Repair, Restoration, and Seismic Strengthening.

UNIT -V

Planning and Design Considerations for Seismic Safety:

Planning and Design Considerations for Seismic Safety– General Planning and Design Considerations; Building forms, Horizontal and Vertical Eccentricities, Mass and Stiffness Distribution, Soft Storey Effects, Etc.; Seismic Effects Related to Building Configuration. Plan and Vertical Irregularities, Redundancy, and Setbacks - Construction Details– Various Types of Foundations, Soil Stabilization, Retaining Walls, Plinth Fill, Flooring, Walls, Openings, Roofs, Terraces, Parapets, Boundary Walls, Underground and Overhead Tanks, Staircases, and Isolation of Structures. Innovative Construction Materials and Techniques - Local Practices– Traditional Regional Responses - Computational Investigation Techniques

TEXT BOOKS

1. David Alexander, *Natural Disasters,* CRC Press, 1st Edition, 2017.
2. Edward A. Keller and Duane E. DeVecchio, *Natural Hazards: Earth's Processes as Hazards, Disasters, and Catastrophes*, Routledge, 5th Edition, 2019.

REFERENCES

1. Ben Wisner, J.C. Gaillard, and IIan Kelman (Editors), *Handbook of Hazards and Disaster Risk Reduction and Management*, Routledge, 2nd Edition, 2012.
2. Damon P. Coppola, *Introduction to International Disaster Management*, Butterworth-Heinemann, 4th Edition, 2020.
3. Bimal Kanti Paul, *Environmental Hazards and Disasters: Contexts, Perspectives and Management*, Wiley-Blackwell, 2nd Edition, 2020.

ONLINE LEARNING RESOURCES

1. https://nptel.ac.in/courses/124107010
2. https://onlinecourses.swayam2.ac.in/cec19_hs20/preview

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(23CE0153) SUSTAINABILITY IN ENGINEERING PRACTICES
(Open Elective course –II)

COURSE OBJECTIVES
The course is designed to

1. *Understand the fundamentals of sustainability, the carbon cycle, and the environmental impact of construction materials.*
2. *Analyze sustainable construction materials, their durability, and life cycle assessment.*
3. *Apply energy calculations in construction materials and assess their embodied energy.*
4. *Evaluate green building standards, energy codes, and performance ratings.*
5. *Assess the environmental effects of energy use, climate change, and global warming.*

COURSE OUTCOMES (COs)
At the end of the course, student will be able to

1. *Recognize the rule of construction materials in contributing to CO_2 emissions from materials*
2. *Choose construction materials that are more sustainable.*
3. *Calculate the embodied energy of various construction materials and assess their contribution to overall building energy consumption.*
4. *Differentiate between embodied and operational energy in buildings and evaluate total life cycle energy use for sustainable construction.*
5. *Implement energy efficiency standards, and rating systems such as LEED, GRIHA, and ECBC, including the role of materials, insulation, and thermal performance in sustainable building design*
6. *Analyze the environmental impacts of non-renewable energy sources, including their role in global warming, greenhouse effects, acid rain, and regional climate changes.*

UNIT -I
Introduction:

Introduction and Definition of Sustainability - Carbon Cycle - Role of Construction Material: Concrete and Steel, Etc. - CO_2 Contribution from Cement and Other Construction Materials.

UNIT -II
Materials used in Sustainable Construction:

Construction Materials and Indoor Air Quality - No/Low Cement Concrete - Recycled and Manufactured Aggregate - Role of QC and Durability - Life Cycle and Sustainability.

UNIT -III

Energy Calculations:

Components of Embodied Energy - Calculation of Embodied Energy for Construction Materials - Energy Concept and Primary Energy - Embodied Energy Via-A-V is Operational Energy in Conditioned Building - Life Cycle Energy Use

UNIT -IV

Green Buildings:

Control of Energy use in Building - ECBC Code, Codes in Neighbouring Tropical Countries - OTTV Concepts and Calculations,Features of LEED and TERI,GRIHA Ratings,Role of Insulation and Thermal Properties of Construction Materials - Influence of Moisture Content and Modelling - Performance Ratings of Green Buildings - Zero Energy Building

UNIT -V

Environmental Effects:

Non-Renewable Sources of Energy and Environmental Impact– Energy Norm, Coal, Oil, Natural Gas - Nuclear Energy - Global Temperature, Green House Effects, Global Warming - Acid Rain: Causes, Effects and Control Methods - Regional Impacts of Temperature Change.

TEXT BOOKS :

1. Charles J Kibert, *Sustainable Construction: Green Building Design & Delivery*, Wiley Publishers, 5th Edition, 2022.
2. Steve Goodhew, *Sustainable Construction Process*, Wiley Blackwell, UK, 2020.

REFERENCES BOOKS:

1. Craig A. Langston & Grace K.C. Ding, *Sustainable Practices in the Built Environment*, Butterworth Heinemann Publishers, 2014.
2. William P Spence, *Construction Materials, Methods & Techniques*, Yesdee Publication Pvt. Ltd, 3rd edition, 2019.

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(23EE0262) RENEWABLE ENERGY SOURCES
(Open Elective course –II)

COURSE OBJECTIVES

The course is designed to

1. *Know the importance of energy, resources of renewable energy, their usage and impact on environment.*
2. *Recognize the significance of solar energy, its harnessing technologies & its applications.*
3. *Identify the method of exploiting energy from wind and parameters to be considered for the selection of site for wind turbine installation.*
4. *Explain the concept of bio energy and its conversion devices.*
5. *Differentiate various renewable energies such as tidal energy, fuel cells.*

COURSE OUTCOMES

After successful completion of this course, students will be able to:

1. *State various sources of energies, its availability and explain the importance of them by observing the global energy scenario.*
2. *Distinguish the types of solar energy tapping devices and describe the method of harnessing the solar energy.*
3. *Summarize the wind energy systems and elucidate the impact of it in environmental aspects.*
4. *Describe the biomass conversion process and list out various bioenergy applications.*
5. *Interpret the knowledge of renewable energies such as tidal energy, OTEC.*
6. *Identify numerous applications renewable energy resources and illustrate its harnessing technologies.*

UNIT -I

Solar Energy

Solar radiation - beam and diffuse radiation, solar constant, Sun at Zenith, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. Flat plate collectors, concentrating collectors, storage of solar energy - thermal storage.

UNIT -II

PV Energy Systems

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Solar PV modules from solar cells, mismatch in series and parallel connections design and structure of PV modules, Electrical characteristics of silicon PV cells and modules, Stand-alone PV system configuration, Grid connected PV systems

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UNIT -III

Wind Energy

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal

and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades; wind data and energy estimation and site selection considerations.

UNIT -IV

Geothermal Energy

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India

UNIT -V

Miscellaneous Energy Technologies

Ocean Energy: Tidal Energy ,Principle of working, Operation methods, advantages and limitations. Wave Energy Principle of working, energy and power from waves, wave energy conversion devices, advantages and limitations.Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration.
Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations.

TEXT BOOK:

1. G. D. Rai, *Non-Conventional Energy Sources*, 4th Edition, Khanna Publishers, 2000.
2. Chetan Singh Solanki, *Solar Photovoltaics: Fundamentals, Technologies and Applications*, 2nd Edition, PHI Learning Private Limited, 2012.

REFERENCE BOOK:

1. Stephen Peake, *Renewable Energy: Power for a Sustainable Future*, Oxford International Edition, 2018.
2. S. P. Sukhatme, *Solar Energy*, 3rd Edition, Tata McGraw Hill Education Pvt. Ltd., 2008.
3. B. H. Khan, *Non-Conventional Energy Resources*, 2nd Edition, Tata McGraw Hill Education Pvt. Ltd., 2011.
4. S. Hasan Saeed and D. K. Sharma, *Non-Conventional Energy Resources*, 3rd Edition, S. K. Kataria & Sons, 2012.
5. G. N. Tiwari and M. K. Ghosal, *Renewable Energy Resource: Basic Principles and Applications*, Narosa Publishing House, 2004.

ONLINE REFERENCE :

1. https://nptel.ac.in/courses/103103206
2. https://nptel.ac.in/courses/108108078

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(23ME0349) AUTOMATION AND ROBOTICS
(Open Elective course (OE) –II)

COURSE OBJECTIVES

The objectives of this course are to make the student:

1. *Fundamentals of industrial automation, production types, automation strategies, and hardware elements used in modern manufacturing processes.*
2. *Understanding of automated manufacturing systems, and strategies for improving productivity and flexibility in industrial automation*
3. *Knowledge of industrial automation and robotics, sensors, and end-effector design for modern manufacturing environments.*
4. *Explain industrial automation and robotics, and trajectory planning for intelligent and efficient manufacturing applications.*
5. *Familiarity of industrial automation and robotics, and practical applications in manufacturing processes.*

COURSE OUTCOMES

After successful completion of this course, students will be able to:

1. *Understand and analyze the structure and functions of automated manufacturing systems, and evaluate hardware components for efficient production.*
2. *Analyze and design automated flow lines with or without buffer storage, perform quantitative evaluations, apply assembly line balancing techniques.*
3. *Classify robot configurations, select suitable actuators and sensors, analyze and apply automation and robotics principles to optimize production efficiency and flexibility.*
4. *Explain the various components of robots andits feedback syatemsandits corrective measures*
5. *Apply kinematic and dynamic modeling using D-H notation and select appropriate hardware and control strategies for real-world industrial scenario to analyze and design automated and robotic systems.*
6. *Design, program, and implement robotic systems, understand and apply robotics technology to manufacturing tasks.*

UNIT-I

Introduction to Automation

Introduction to Automation, Need, Types, Basic elements of an automated system, Manufacturing Industries, Types of production, Functions in manufacturing, Organization and information processing in manufacturing, Automation strategies and levels of automation, Hardware components for automation and process control, mechanical feeders, hoppers, orienters, high speed automatic insertion devices.

UNIT –II

Automated flow lines:

Automated flow lines, Part transfer methods and mechanisms, types of Flow lines, flow line with/without buffer storage, Quantitative analysis of flow lines. Assembly line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT- III

Introduction to Industrial Robotics

Introduction to Industrial Robotics, Classification of Robot Configurations, functional line diagram, degrees of freedom. Components common types of arms, joints grippers, factors to be considered in the design of grippers.

Robot actuators and Feedback components: Actuators, Pneumatic, Hydraulic actuators, Electric & Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity sensors, Tactile sensors, Proximity sensors.

UNIT- IV

Manipulator Kinematics

Manipulator Kinematics, Homogenous transformations as applicable to rotation and transition - D-H notation, Forward inverse kinematics.

Manipulator Dynamics: Differential transformations, Jacobians, Lagrange - Euler and Newton – Euler formations. Trajectory Planning: Trajectory Planning and avoidance of obstacles path planning, skew motion, joint integrated motion - straight line motion.

UNIT- V

Robot Programming

Robot Programming, Methods of programming - requirements and features of programming languages, software packages. Problems with programming languages.

Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading – Process spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOK:

1. M.P. Groover, *Automation , Production systems and CIM*, Pearson Edu. 2008
2. M.P. Groover *Industrial Robotics* , TMH, 1986

REFERENCE BOOK:

1. Fu K S, *Robotics* McGraw Hill, 4th edition, 2010.
2. P. Coiffet and M. Chaironze, Kogam *An Introduction to Robot Technology*, Page Ltd. London. 1983
3. Ashitave Ghosal *Robotics, Fundamental Concepts and analysis*, Oxford Press, 1/e, 2006
4. Mittal R K &Nagrath I J *Robotics and Control*, TMH, 1999

ONLINE REFERENCE :

1. https://www.youtube.com/watch?v=yxZm9WQJUA0&list=PLRLB5WCqU54UJG45UnazSYmnmhl-gt76o
2. https://www.youtube.com/watch?v=6f3bvIhSWyM&list=PLRLB5WCqU54X5Vy4DwjfSODT3ZJ gwEjyE

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III B.Tech - II Sem.

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(23EC0441) DIGITAL ELECTRONICS
(Open Elective course –II)

COURSE OBJECTIVES

The course is designed to

1. *To Learn Boolean algebra, logic simplification techniques, and combinational circuit design.*
2. *To analyze combinational circuits like adders, subtractors, and code converters.*
3. *To explore combinational logic circuits and their applications in digital design.*
4. *To understand sequential logic circuits, including latches, flip-flops, counters, and shift registers.*
5. *To gain knowledge about programmable logic devices and digital IC's.*

COURSE OUTCOMES

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

1. *Apply Boolean algebra and Karnaugh Maps to simplify and analyze logic expressions.*
2. *Design basic logic gates like AND, OR, NAND, NOR, XOR..*
3. *Analyze and design combinational circuits like adders, subtractors, and perform code conversions.*
4. *Design and implement logic functions using multiplexers, decoders, encoders, and comparators.*
5. *Understand sequentiall logic circuits, including latches, flipflops, counters, and shift registers.*
6. *Implement logic circuits using ROM, PLA, PAL, and standard digital ICs like 74-series.*

UNIT-I

Logic Simplification and Combinational Logic Design:

Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Introduction to Logic Gates, Ex-OR, Ex-NOR operations, Minimization of Switching Functions: Karnaugh map method, Logic function realization: AND-OR, OR-AND and NAND/NOR realizations.

UNIT-II

Introduction to Combinational Design 1:

Binary Adders, Subtractors and BCD adder, Code converters - Binary to Gray, Gray to Binary, BCD to excess3, BCD to Seven Segment display.

UNIT-III

Combinational Logic Design 2:

Decoders, Encoders, Priority Encoder, Multiplexers, Demultiplexers, Comparators, Implementations of Logic Functions using Decoders and Multiplexers.

UNIT-IV

Sequential Logic Design:

Latches, Flip-flops, S-R, D, T, JK and Master-Slave JK FF, Edge triggered FF, set up and hold times, Ripple counters, Shift registers.

UNIT-V

Programmable Logic Devices:

ROM, Programmable Logic Devices (PLA and PAL).

Digital IC's: Decoder (74x138), Priority Encoder (74x148), multiplexer (74x151) and de-multiplexer (74x155), comparator (74x85).

TEXT BOOKS:

1. M. Morris Mano and Michel D. Ciletti, *Digital Design*, 5th Edition, Pearson Education, 1999.
2. Zvi Kohavi and Nirah K. Jha, *Switching Theory and Finite Automata Theory*, 2nd Edition, Tata McGraw-Hill, 2005.

REFERENCE BOOKS:

1. Charles H. Roth, Jr., *Fundamentals of Logic Design*, 5th Edition, Brooks/Cole Cengage Learning, 2004.

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(23HS0858) MATHEMATICAL FOUNDATION OF QUANTUM TECHNOLOGIES
(Open Elective -II)
(Common to All Branches)

COURSE OBJECTIVES

The course is designed to

1. *To provide students with essential linear algebra foundations including vector spaces, inner products, and operators for quantum mechanical applications.*
2. *To develop understanding of the transition from finite-dimensional systems to infinite-dimensional function spaces and Hilbert space concepts.*
3. *To establish quantum mechanical formalism including measurement theory, uncertainty relations, and time evolution principles.*
4. *To enable students to apply quantum mechanical principles to solve problems in simple quantum systems and understand statistical interpretation.*
5. *To introduce advanced concepts in composite systems, measurement processes, and modern perspectives in quantum mechanics.*

COURSE OUTCOMES

After successful completion of this course, the students should be able to

1. *Apply linear algebra concepts to function spaces and analyze the transition from finite to infinite dimensional systems.*
2. *Understand vector spaces, inner products, and linear operators with applications to quantum systems.*
3. *Analyze quantum mechanical formalism including measurement theory, uncertainty relations, and time evolution.*
4. *Apply quantum mechanical principles to solve problems in simple quantum systems and evaluate statistical interpretations.*
5. *Understand statistical applications and interpretation with measurement processes..*
6. *Evaluate advanced concepts in composite systems and synthesize understanding of measurement processes and modern quantum theory.*

UNIT I

Linear Algebra Foundation for Quantum Mechanics

Vector spaces definition and examples (R^2, R^3, function spaces), Inner products (dot product, orthogonality, normalization), Linear operators (matrices, eigenvalues, eigenvectors), Finite-dimensional examples (2×2 matrices, spin-1/2 systems), Dirac notation introduction ($|\psi\rangle$, $\langle \varphi|$, $\langle \varphi|\psi\rangle$), Change of basis (transformations, unitary matrices).

UNIT II

From Finite to Infinite Dimensions

Function spaces (L^2 space, square-integrable functions), Inner products for functions ($\int \phi^* \phi \, dx$),

Orthogonal function sets (Fourier series, basis functions), Introduction to Hilbert space concept (complete inner product spaces), Position and momentum representations (wave functions), Operators on functions (d/dx, multiplication by x)..

UNIT III

Quantum Mechanical Formalism

Mathematical formulation (states as vectors, observables as operators), Measurement theory (Born rule, expectation values, probabilities), Uncertainty relations (mathematical derivation from commutators), Time evolution (Schrödinger equation, unitary evolution).

UNIT IV

Applications and Statistical Interpretation

Simple applications (infinite square well, harmonic oscillator), Statistical interpretation (ensembles, pure vs mixed states), Measurement process (von Neumann measurement scheme).

UNIT V

Advanced Topics

Composite systems (tensor products basic introduction), Reversibility and irreversibility (unitary evolution vs measurement), Thermodynamic connections (equilibrium states, entropy), Modern perspectives (decoherence, measurement problem conceptual).

TEXT BOOKS

1. David J. Griffiths, Darrell F. Schroeter, ―*Introduction to Quantum Mechanics*, 3rd Edition, Cambridge University Press (2018).
2. R. Shankar, *Principles of Quantum Mechanics*, 2nd Edition, Kluwer Academy/Plenum Publishers (1994).

REFERENCES

1. George. F. Simmons, ―*Introduction to Topology and Modern Analysis*, MedTech Science Press.
2. Gilbert Strang, *Linear Algebra and Its Applications*, 4th Edition, Cengage Learning (2006).
3. John von Neumann and Robert T Beyer, *Mathematical Foundations of Quantum Mechanics*,Princeton Univ. Press (1996).

WEB RESOURCES

1. https://eclass.uoa.gr/modules/document/file.php/CHEM248/Griffiths%20-%20Introduction%20to%20Quantum%20Mechanics%203rd%20ed%202018.pdf

2. https://fisica.net/mecanica-quantica/Shankar%20-%20Principles%20of%20quantum%20mechanics.pdf

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III B.Tech - II Sem.

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(23HS0843) PHYSICS OF ELECTRONIC MATERIALS AND DEVICES
(Open Elective course –II)

COURSE OBJECTIVES

The objectives of this course

1. *To make the students to understand the concept of crystal growth, defects in crystals and thin films.*
2. *To provide insight into various semiconducting materials and their properties.*
3. *To develop a strong foundation in semiconductor physics and device engineering.*
4. *To elucidate excitonic and luminescent processes in solid-state materials.*
5. *To understand the principles, technologies, and applications of modern display systems.*

COURSE OUTCOMES

1. *Understand crystal growth and thin film preparation*
2. *Summarize the basic concepts of semiconductors*
3. *Illustrate the working of various semiconductor devices*
4. *Explain the different type of Transistors*
5. *Analyze various luminescent phenomena and the devices based on these concepts*
6. *Explain the working of different display devices*

UNIT-I

Fundamentals of Materials Science

Introduction, Phase rule, Phase Diagram, Elementary idea of Nucleation and Growth, Methods of crystal growth. The basic idea of point, line, and planar defects. Concept of thin films, preparation of thin films, Deposition of thin film using sputtering methods (RF and glow discharge)

UNIT II

Semiconductors

Introduction, charge carriers in semiconductors, effective mass, Diffusion and drift, Diffusion and recombination, Diffusion length. The Fermi level & Fermi-Dirac distribution, Electron and Hole in quantum well, Change of electron-hole concentration- Qualitative analysis, Temperature dependency of carrier concentration, Conductivity and mobility, Effects of temperature and doping on mobility, High field effects.

UNIT III

Physics of Semiconductor Devices:

Introduction, Band structure, PN junctions and their typical characteristics under equilibrium and under bias, Heterojunctions, Transistors, MOSFETs.

UNIT IV

Excitons and Luminescence:

Luminescence: Different types of luminescence, basic definitions, Light emission in solids, Inter-band luminescence, Direct and indirect gap materials.

Photoluminescence : General Principles of photoluminescence, Excitation and relaxation, OLED, Quantum-dot.

Electro-luminescence : General Principles of electroluminescence, light emitting diode, diode laser.

UNIT V Display devices :

LCD, three-dimensional display: Holographic display, light-field displays: Head-mounted display, MOEMS (Micro-Opto-Electro-Mechanical Systems)

TEXT BOOKS:

1. S. O. Kasap, *Principles of Electronic Materials and Devices*, 4th Edition, McGraw-Hill Education (India) Pvt. Ltd., 2021.
2. Donald A. Neamen, *Semiconductor Physics & Devices: Basic Principles*, 4th Edition, McGraw-Hill, 2012.

REFERENCE BOOKS:

1. B. G. Streetman and S. Banerjee, *Solid State Electronic Devices*, 6th Edition, PHI Learning.
2. Eugene A. Irene, *Electronic Materials Science*, Wiley, 2005.
3. Grover and Jamwal, *Electronic Components and Materials*, Dhanpat Rai and Co., New Delhi, 2012.
4. Wei Gao, Zhengwei Li, and Nigel Sammes, *An Introduction to Electronic Materials for Engineers*, 2nd Edition, World Scientific Publishing Co. Pvt. Ltd., 2011.

NPTEL COURSE LINKS:

1. https://nptel.ac.in/courses/113/106/113106062/
2. https://onlinecourses.nptel.ac.in/noc20_ph24/preview

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III B.Tech - II Sem.

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(23HS0807) CHEMISTRY OF POLYMERS AND APPLICATIONS
(Open Elective course –II)
(Common toALL Branches of Engineering)

COURSE OBJECTIVES

The course is designed to

1. *To understand the basic principles of polymers*
2. *To understand natural polymers and their applications.*
3. *To impart knowledge to the students about synthetic polymers, their preparation and importance.*
4. *To enumerate the applications of hydogel polymers*
5. *To enumerate applications of conducting and degradable polymers in engineering.*

COURSE OUTCOMES

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

1. *Understand fundamentals of polymers and moulding of plastics.*
2. *Analyze the chemical and physical properties of natural polymers and their applications.*
3. *Apply the knowledge of thermoplastic and thermoset polymers in practical situations.*
4. *Evaluate the environmental and industrial relevance of synthetic polymers and their applications.*
5. *Understand the fundamental principles of hydrogel in polymer networks.*
6. *Analyze the preparation and mechanism of conducting and degradable polymers.*

UNIT – I

POLYMERS BASICS AND CHARACTERIZATION

Basic concepts of Polymers, Average molecular weight concepts: number, weight and viscosity average molecular weights, polydispersity and molecular weight distribution. Measurement of molecular weight: End group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers.

UNIT – II

NATURAL POLYMERS & MODIFIED CELLULOSICS

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins.

Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose

acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEA.

UNIT – III

SYNTHETIC POLYMERS

Addition and condensation polymerization processes– Bulk, Solution, Suspension and Emulsion polymerization. Preparation and significance, classification of polymers based on physical properties. Fibers and elastomers, General Applications. Preparation of Polymers based on different types of monomers, Olefin polymers (PE, PVC),Poly Carbonates,Urea-formal dehyde, phenol – formaldehyde, Melamine-Formaldehyde,Epoxy and Ion exchange resins.

UNIT-IV

HYDROGELS OF POLYMER NETWORKS

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels**,** Applications of hydrogels in drug delivery.

UNIT – V

CONDUCTING AND DEGRADABLE POLYMERS

Conducting polymers: Introduction, Classification, Mechanism of conduction in Poly Acetylene, Poly Aniline, Poly Thiophene, Doping, Applications.

Degradable polymers: Introduction, Classifications, Examples, Mechanism of degradation, poly lactic acid, Nylon-6, Polyesters, applications.

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TEXT BOOKS:

1. F. W. Billmeyer, *A Textbook of Polymer Science*.
2. G. S. Mishra, *Polymer Chemistry*.
3. V. R. Gowariker, *Polymer Chemistry*.

REFERENCES BOOKS::

1. K. J. Saunders, *Organic Polymer Chemistry*, Chapman and Hall.
2. B. Miller, *Advanced Organic Chemistry*, Prentice Hall.
3. Premamoy Ghosh, *Polymer Science and Technology*, 3rd Edition, McGraw-Hill, 2011.

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(23HS0823) ACADEMIC WRITING AND PUBLIC SPEAKING
(Open Elective course –II)

(Common to All Branches of Engineering)

COURSE OBJECTIVES
The course is designed to

1. *To encourage all round development of the students by focusing on writing skills*
2. *To make the students aware of non-verbal skills*
3. *To develop analytical skills*
4. *To deliver effective public speeches*

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

1. *Understand various elements of Academic Writing*
2. *Identify sources and avoid plagiarism*
3. *Demonstrate the knowledge in writing a Research paper*
4. *Analyse different types of essays*
5. *Assess the speeches of others and know the positive strengths of speakers*
6. *Build confidence in giving an impactful presentation to the audience*

UNIT - I
Introduction to Academic Writing

Introduction to Academic Writing, Essential Features of Academic Writing, Courtesy, Clarity, Conciseness,Correctness, Coherence, Completeness, Types,Descriptive, Analytical, Persuasive, Critical writing

UNIT - II
Academic Journal Article

Art of condensation- summarizing and paraphrasing - Abstract Writing, writing Project Proposal, writing application for internship, Technical/Research/Journal Paper Writing,Conference Paper writing - Editing, Proof Reading,Plagiarism

UNIT - III
Essay & Writing Reviews

Compare and Contrast,Argumentative Essay,Exploratory Essay,Features and Analysis of Sample Essays,Writing Book Report, Summarizing, Book/film Review- SoP

UNIT - IV

Public Speaking

Introduction, Nature, characteristics, significance of Public Speaking,Presentation,4 Ps of Presentation,Stage Dynamics,Answering Strategies –Analysis of Impactful Speeches- Speeches for Academic events

UNIT - V

Public Speaking and Non-Verbal Delivery

Body Language,Facial Expressions-Kinesics,Oculesics,Proxemics,Haptics,Chronomics - Paralanguage,Signs

TEXT BOOKS:

1. *Critical Thinking, Academic Writing and Presentation Skills: MG University Edition*, Pearson Education, First Edition, 1 January 2010.
2. Allan Pease and Barbara Pease, *The Definitive Book of Body Language*, RHUS Publishers, 2016.

REFERENCE BOOKS:

1. Alice Savage and Masoud Shafiei, *Effective Academic Writing*, 2nd Edition, Oxford University Press, 2014.
2. Shalini Verma, *Body Language*, S. Chand Publications, 2011.
3. Sanjay Kumar and Pushp Lata, *Communication Skills*, 2nd Edition, Oxford University Press, 2015.
4. Sharon Gerson and Steven Gerson, *Technical Communication: Process and Product*, Pearson, New Delhi, 2014.
5. Peter Elbow, *Writing with Power*, Oxford University Press (OUP), USA, 1998.

ONLINE LEARNING RESOURCES:

1. https://youtu.be/NNhTIT81nH8p
2. https://www.youtube.com/watch?v=478ccrWKY-A
3. https://www.youtube.com/watch?v=nzGo5ZC1gMw
4. https://www.youtube.com/watch?v=Qve0ZBmJMh4
5. https://onlinecourses.nptel.ac.in/noc21_hs76/preview
6. https://archive.nptel.ac.in/courses/109/107/109107172/#
7. https://archive.nptel.ac.in/courses/109/104/109104107/

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III B.Tech - II Sem.

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(23CS0526) MACHINE LEARNING LAB

COURSE OBJECTIVES

The course is designed to

1. *To learn about computing central tendency measures and Data pre processing techniques*
2. *To learn about classification and regression algorithms*
3. *To apply different clustering algorithms for a problem.*

COURSE OUTCOMES:

After completion of the course, students will be able to

1. *Understand the Mathematical and statistical prospective of machine learning algorithms through python programming*
2. *Appreciate the importance of visualization in the data analytics solution.*
3. *Derive insights using Machine learning algorithms*

Software Required: Python/R/Weka

List of Experiments:

1. Compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation.
2. Apply the following Pre-processing techniques for a given dataset.
   a. Attribute selection
   b. Handling Missing Values
   c. Discretization
   d. Elimination of Outliers
3. Apply KNN algorithm for classification and regression
4. Demonstrate decision tree algorithm for a classification problem and perform parameter tuning for better results
5. Demonstrate decision tree algorithm for a regression problem
6. Apply Random Forest algorithm for classification and regression
7. Demonstrate Naïve Bayes Classification algorithm.
8. Apply Support Vector algorithm for classification
9. Demonstrate simple linear regression algorithm for a regression problem
10. Apply Logistic regression algorithm for a classification problem
11. Demonstrate Multi-layer Perceptron algorithm for a classification problem
12. Implement the K-means algorithm and apply it to the data you selected. Evaluate performance by measuring the sum of the Euclidean distance of each example from its class center. Test the performance of the algorithm as a function of the parameters K.
13. Demonstrate the use of Fuzzy C-Means Clustering

14. Demonstrate the use of Expectation Maximization based clustering algorithm

REFERENCES BOOKS:

1. Malik, M. Usman, *Python Machine Learning Workbook for Beginners*, AI Publishing, 2020.

ONLINE LEARNING RESOURCES / VIRTUAL LABS:

1. Machine Learning A-Z (Python & R in Data Science Course) | Udemy
2. Machine Learning | Coursera

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(23CS0527) CRYPTOGRAPHY & NETWORK SECURITY LAB

COURSE OBJECTIVES

The course is designed to

1. *Understand and apply classical and modern encryption techniques.*
2. *Implement symmetric and asymmetric cryptographic algorithms.*
3. *Explore hashing techniques for secure message transmission.*
4. *Use programming tools for cryptographic logic and key management.*

COURSE OUTCOMES:

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

1. *Implement basic ciphers like Caesar and Hill.*
2. *Apply DES, Blowfish, and Rijndael algorithms.*
3. *Demonstrate RSA encryption and decryption.*
4. *Develop key exchange using Diffie-Hellman.*
5. *Compute message digests using SHA-1 and MD5.*
6. *Utilize Java cryptography for secure communication.*

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value ‗Hello world'. The program should XOR each character in this string with 0 and displays the result.

2. Write a C program that contains a string (char pointer) with a value ‗Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms
   a. Ceaser cipher
   b. Substitution cipher
   c. Hill Cipher
4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text ―Hello world‖ using Blowfish. Create your own key using Java key tool.

8. Write a Java program to implement RSA algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

REFERENCES BOOKS:

1. William Stallings, *Cryptography and Network Security: Principles and Practice*, Pearson Education.
2. Behrouz A. Forouzan, *Cryptography and Network Security*, McGraw Hill.
3. Atul Kahate, *Cryptography and Network Security*, Tata McGraw-Hill.
4. Charlie Kaufman, Radia Perlman, Mike Speciner, *Network Security: Private Communication in a Public World*, Pearson Education.
5. Bruce Schneier, *Applied Cryptography: Protocols, Algorithms, and Source Code in C*, Wiley.

Online Learning Resources:

1. https://nptel.ac.in/courses/106105031
2. https://docs.oracle.com/en/java/javase/17/security/java-cryptography-architecture-jca-reference -guide .html

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(23HS0818) SOFT SKILLS
(Skill Enhancement course)

COURSE OBJECTIVES

The course is designed to

1. *To encourage all round development of the students by focusing on soft skills*
2. *To make the students aware of critical thinking and problem-solving skills*
3. *To enhance healthy relationship and understanding within and outside an organization*
4. *To function effectively with heterogeneous teams*

COURSE OUTCOMES:

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

1. *List out various elements of soft skill*
2. *Describe methods for building professional image*
3. *Apply critical thinking skills in problem solving*
4. *Analyze the needs of an individual and team for well-being*
5. *Assess the situation and take necessary decisions*
6. *Create a productive work place atmosphere using social and work-life skills ensuring personal and emotional well-being*

UNIT -I

Soft Skills & Communication Skills

Soft Skills - Introduction, Need - Mastering Techniques of Soft Skills,Communication Skills - Significance, process, types - Barriers of communication - Improving techniques

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought,self-expression,articulating with felicity

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion,Debate,Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication,Public speaking,Mock interviews,presentations with an objective to identify non- verbal clues and remedy the lapses on observation

UNIT -II

Critical Thinking

Active Listening, Observation, Curiosity, Introspection, Analytical Thinking, Open-mindedness, Creative Thinking - Positive thinking - Reflection

Activities:

Gathering information and statistics on a topic - sequencing,assorting,reasoning,critiquing issues,placing the problem,finding the root cause - seeking viable solution,judging with rationl evaluating the views of others - Case Study, Story Analysis

UNIT -III

Problem Solving & Decision Making

Meaning & features of Problem Solving,Managing Conflict,Conflict resolution –Team building - Effective decision making in teams,Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views,formulating the problem,exploring solutions by proper reasoning,Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion

UNIT -IV

Emotional Intelligence & Stress Management

Managing Emotions,Thinking before Reacting,Empathy for Others,Self-awareness,Self-Regulation,Stress factors,Controlling Stress,Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations.

Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

UNIT -V

Corporate Etiquette

Etiquette- Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette -Corporate grooming tips - Overcoming challenges

Activities

Providing situations to take part in the Role Plays where the students will learn about bad and good manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. - Conducting mock job interviews - Case Study - Business Etiquette Games

TEXT BOOKS:

1. Mitra, Barun K., *Personality Development and Soft Skills*, Oxford University Press, Pap/Cdr edition, 2012.
2. Kapoor, Shikha, *Personality Development and Soft Skills: Preparing for Tomorrow*, KI International Publishing House, 2018.

REFERENCES BOOKS:

1. Sharma, Prashant, *Soft Skills: Personality Development for Life Success*, BPB Publications, 2018.
2. Alex, K., *Soft Skills*, S. Chand & Co., Revised Edition, 2012.
3. Chauhan, Gajendra Singh and Sharma, Sangeetha, *Soft Skills: An Integrated Approach to Maximise Personality*, Wiley, 2013.
4. Pillai, Sabina and Fernandez, Agna, *Soft Skills and Employability Skills*, Cambridge University Press, 2018.

ONLINE LEARNING RESOURCES:

1. https://youtu.be/-Y-R9hDl7lU
2. https://youtu.be/gkLsn4ddmTs
3. https://youtu.be/2bf9K2rRWwo
4. https://youtu.be/FchfE3c2jzc
5. https://www.businesstrainingworks.com/training-resource/five-free-business-etiquette-training-games/
6. https://onlinecourses.nptel.ac.in/noc24_hs15/preview
7. https://onlinecourses.nptel.ac.in/noc21_hs76/
8. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y- bOO1_q
9. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7Kl J

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III B.Tech - II Sem.

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(23HS0816) TECHNICAL PAPER WRITING & IPR
(Audit Course)
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The course is designed to

1. *To enable the students to practice the basic skills of research paper writing*
2. *To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights.*
3. *To practice the basic skills of performing quality literature review*
4. *To help them in knowing the significance of real life practice and procedure of Patents.*
5. *To enable them learn the procedure of obtaining Patents, Copyrights, & Trade Marks*

COURSE OUTCOMES

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

1. *Identify key secondary literature related to their proposed technical paper writing*
2. *Explain various principles and styles in technical writing*
3. *Use the acquired knowledge in writing a research/technical paper*
4. *Analyse rights and responsibilities of holder of Patent, Copyright, trademark, International Trademark etc.*
5. *Evaluate different forms of IPR available at national & international Level*
6. *Develop skill of making search of various forms of IPR by using modern ools and techniques.*

UNIT – I

Principles Of Technical Writing:

Styles In Technical Writing; Clarity, Precision, Coherence And Logical Sequence in Writing-Avoiding Ambiguity- Repetition, And Vague Language- Highlighting Your Findings-Discussing Your Limitations -Hedging and Criticizing -Plagiarism and Paraphrasing.

UNIT – II

Technical Research Paper Writing:

Abstract-Objectives-Limitations-Review of Literature- Problems and Framing Research Questions-Synopsis.

UNIT – III

Process of Research: Publication Mechanism:

Types of Journals- Indexing-Seminars- Conferences-Proof Reading–Plagiarism Style; Seminar & Conference Paper Writing; Methodology-Discussion-Results- Citation Rules.

UNIT – IV

Introduction to Intellectual Property:

Introduction, Types of Intellectual Property, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights: Purpose and Function of Trade-Marks, Acquisition of Trade-Mark Rights, Protectable Matter, Selecting Evaluating Trade Mark and Trade Mark Registration Processes.

UNIT – V

Law of Copy Rights:

Fundamentals of Copy Right Law, Originality of Material, Rights of Reproduction, Rights to Perform the Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice of Copy Right, International Copy Right Law, Law of Patents: Foundation of Patent Law, Patent Searching Process, Ownership Rights and Transfer. Patent Law and Intellectual Property Audits.

TEXT BOOKS:

1. Deborah E. Bouchoux, *Intellectual Property Rights*, Cengage Learning India, 2013.
2. Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practices*, Oxford University Press.

REFERENCES BOOKS:

1. R. Myneni, *Law of Intellectual Property*, 9th Edition, Asia Law House, 2019.
2. Prabuddha Ganguli, *Intellectual Property Rights*, Tata McGraw-Hill, 2001.
3. P. Narayan, *Intellectual Property Law*, 3rd Edition, Eastern Law House, 2007.
4. Adrian Wallwork, *English for Writing Research Papers*, 2nd Edition, Springer, Cham, Heidelberg, New York, 2016.
5. Dan Jones and Sam Dragga, *Technical Writing Style*.

ONLINE RESOURCES

1. https://theconceptwriters.com.pk/principles-of-technical-writing/
2. https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWritin g.html
3. https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWritin g.html
4. https://www.manuscriptedit.com/scholar-hangout/process-publishing-research-paper-journal/
5. https://www.icsi.edu/media/website/IntellectualPropertyRightLaws&Practice.pdf
6. https://lawbhoomi.com/intellectual-property-rights-notes/
7. https://www.extension.purdue.edu/extmedia/ec/ec-723.pdf

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IV B.Tech - I Sem.

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(23CS0528) DEEP LEARNING

COURSE OBJECTIVES

The course is designed to

1. *Demonstrate the major technology trends driving Deep Learning*
2. *Build, train, and apply fully connected deep neural networks*
3. *Implement efficient (vector zed) neural networks*
4. *Analyse the key parameters and hyper parameters in a neural network's architecture*

COURSE OUTCOMES

After completion of the course, students will be able to

1. *Demonstrate the mathematical foundation of neural network*
2. *Describe the machine learning basics*
3. *Differentiate architecture of deep neural network*
4. *Build a convolution neural network*
5. *Build and train RNN and LSTMs*
6. *Deign and deploy deep learning solutions for applications in image processing,*

UNIT-1

Linear Algebra:

Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis. Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bays‘ Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

UNIT-II

Machine Learning:

Basics and Under fitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feed forward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

UNIT-III

Regularization for Deep Learning:

Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier. Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

UNIT-IV

Convolution Networks:

The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolution Networks

UNIT-V

Sequence Modelling:

Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

TEXT BOOKS:

1. Ian Goodfellow, Yoshua Bengio, and Aaron Courville, *Deep Learning*, MIT Press, 2016.
2. Josh Patterson and Adam Gibson, *Deep Learning: A Practitioner's Approach*, O'Reilly Media, First Edition, 2017.

REFERENCE BOOKS:

1. Nikhil Buduma, *Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms*, O'Reilly, Sheriff Publishers, 2019.
2. Douwe Osinga, *Deep Learning Cookbook: Practical Recipes to Get Started Quickly*, O'Reilly, Sheriff Publishers, 2019.

ONLINE LEARNING RESOURCES:

1. https://keras.io/datasets/
2. http://deeplearning.net/tutorial/deeplearning.pdf
3. https://arxiv.org/pdf/1404.7828v4.pdf
4. https://www.cse.iitm.ac.in/~miteshk/CS7015.html
5. https://www.deeplearningbook.org
6. https://nptel.ac.in/courses/106105215

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(23HS0861) BUSINESS ETHICS AND CORPORATE GOVERNANCE

COURSE OBJECTIVES

The course is designed to

1. *To make the student understand the principles of business ethics*
2. *To enable them in knowing about the ethics in management*
3. *To facilitate the student'role in corporate culture*
4. *To impart knowledge about the fair-trade practices*
5. *To encourage the student in knowing about the corporate governance*

COURSE OUTCOMES

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

1. *Apply various ethical principles in business and corporate social responsibility practices*
2. *Recognize how personal ethics can influence behavior and apply in decision making*
3. *Explain the ethical challenges facing the various functional departments*
4. *Identify the organizational and cultural variables that impact ethical judgment*
5. *Analyze various ethical codes in corporate governance*
6. *Identify organizational policies and systems that employ ethical conduct*

UNIT-I

Ethics

Introduction,Meaning,Nature, Scope, significance, Loyalty, and ethical behavior.. Value systems - Business Ethics - Types, Characteristics, Factors, Contradictions and Ethical Practices in Management - Corporate Social Responsibility,Issues of Management,Crisis Management

UNIT-II

ETHICS IN MANAGEMENT

Introduction- Ethics in production, finance, Human resource management and Marketing Management - The Ethical Value System ,Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics,Ethical Values in different Cultures - Culture and Individual Ethics,professional ethics and technical ethics

UNIT-III

CORPORATE CULTURE

Introduction - Meaning, definition, Nature, and significance,Key elements of corporate culture, shared values, beliefs and norms, rituals, symbols and language - Types of corporate culture, hierarchical culture, market driven culture,Organization leadership and corporate culture, leadership styles and their

impact on culture, transformational leadership and culture change.

UNIT- IV

LEGAL FRAME WORK

Law and Ethics -Agencies enforcing Ethical Business Behavior - Legal Impact,Environmental Protection, Fair Trade Practices, legal Compliances, Safeguarding Health and wellbeing of Customers,Corporate law, Securities and financial regulations, corporate governance codes and principles.

UNIT-V

CORPORATE GOVERNANCE

Introduction - Meaning,Corporate governance code, transparency & disclosure -Role of auditors, board of directors and shareholders. Global issues, accounting and regulatory frame work,Corporate scams committees in india and abroad ,corporate social responsibility, BoDs composition ,Cadbury committee-various committees-Reports-Benefits and Limitations.

TEXT BOOKS

1. Murthy, C. S. V., *Business Ethics and Corporate Governance*, Himalaya Publishing House (HPH), July 2017.
2. Dutta, Bholananth, & Podder, S. K., *Corporation Governance*, Vikas Publishing House (VBH), June 2010.

REFERENCE BOOKS

1. Nirmala, Dr. K., & Karunakara Readdy, *Business Ethics and Corporate Governance*, HPH.
2. Machiraju, H. R., *Corporate Governance*, HPH, 2013.
3. Venkataramana, K., *Corporate Governance*, SHBP.
4. Khandelwal, N. M., *Indian Ethos and Values for Managers*.

ONLINE RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc21_mg46/
2. https://archive.nptel.ac.in/courses/110/105/110105138/
3. https://onlinecourses.nptel.ac.in/noc21_mg54/
4. https://onlinecourses.nptel.ac.in/noc22_mg54/
5. https://archive.nptel.ac.in/courses/109/106/109106117/

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(23HS0862) E-BUSINESS

COURSE OBJECTIVES

The Objectives of this course are

1. *To provide knowledge on emerging concept on E-Business related aspect.*
2. *To understand various electronic markets & business models.*
3. *To impart the information about electronic payment systems & banking.*
4. *To create awareness on security risks and challenges in E-commerce.*
5. *To the students aware on different e-marketing channels & strategies.*

COURSE OUTCOMES

After the completion of the course, the student will be able to:

1. *Remember E-Business & its nature, scope and functions.*
2. *Understand E-market-Models which are practicing by the organizations*
3. *Apply the concepts of E-Commerce in the present globalized world.*
4. *Analyze the various E-payment systems & importance of net banking.*
5. *Evaluate market research strategies & E-advertisements.*
6. *Understand importance of E-security & control*

UNIT-I

Electronic Business

Introduction ,Nature, meaning, significance, functions and advantages - Definition of Electronic Business - Functions of Electronic Commerce (EC)-Advantages & Disadvantages of E-Commerce – E- Commerce and E-Business, Internet Services, Online Shopping- E-Commerce Opportunities for Industries.

UNIT-II

Electronic Markets and Business Models

Introduction –E-Shops-E-Malls E-Groceries - Portals - Vertical Portals-Horizontal Portals - Advantages of Portals -Business Models- Business to Business (B2B)-Business to Customers(B2C) - Business to Government(B2G)-Auctions-B2B Portals in India

UNIT-III

Electronic Payment Systems:

Introduction to electronic payment systems (EPS) -Types of electronic payments - Credit/debit cards, e- wallets, UPI, and crypto currencies -Smart cards and digital wallets: Features and usage -

Electronic Fund Transfer (EFT): Role in business transactions -Infrastructure requirements and regulatory aspects of e-payments

UNIT-IV

E-Security

Security risks and challenges in electronic commerce - Cyber threats - Phishing, hacking, identity theft, and malware - Digital Signatures & Certificates - Security protocols over public networks (HTTP, SSL, TLS) -Firewalls in securing e-business platforms.

UNIT-V

E-Marketing:

Introduction ,Online Marketing ,Advantages of Online Marketing ,Internet Advertisement ,Advertisement Methods,Conducting Online Market Research–,E-marketing planning: Online branding, social media marketing, and email marketing - E-business strategies: Digital advertising, content marketing, and analytics,E-Customer Relationship Management (eCRM) E-supply chain management (e-SCM)

TEXT BOOKS

1. Arati Oturkar & Sunil Khilari, *E-Business*, Everest Publishing House, 2022.
2. P.T.S. Joseph, *E-Commerce*, 4th Edition, Prentice Hall of India, 2011.

REFERENCE BOOKS

1. Debjani, Kamalesh K. Bajaj, *E-Commerce*, 2nd Edition, Tata McGraw-Hill, 2005.
2. Dave Chaffey, *E-Commerce E-Management*, 2nd Edition, Pearson, 2012.
3. Henry Chan, *E-Commerce: Fundamentals and Application*, Raymond Leatham, Wiley India, 2007.
4. S. Jaiswal, *E-Commerce*, Galgotia Publication Pvt. Ltd., 2003.

ONLINE RESOURCES:

https://www.slideshare.net/fatimahAlkreem/e-businesspppt-67935771
https://www.slideshare.net/VikramNani/e-commerce-business-models
https://www.slideshare.net/RiteshGoyal/electronic-payment-system
https://www.slideshare.net/WelingkarDLP/electronic-security

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(23HS0863) MANAGEMENT SCIENCE

COURSE OBJECTIVES

The objective of this course

1. *To provide fundamental knowledge on Management, Administration, Organization & its concepts.*
2. *To make the students understand the role of management in Production*
3. *To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts*
4. *To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management*
5. *To make the students aware of the contemporary issues in modern management*

COURSE OUTCOMES

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

1. *Remember the concepts & principles of management and designs of organization in a practical world*
2. *Understand the knowledge of Work-study principles & Quality Control techniques in industry*
3. *Apply the process of Recruitment & Selection in organization.*
4. *Analyze the concepts of HRM & different training methods.*
5. *Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.*
6. *Create awareness on contemporary issues in modern management & technology.*

UNIT I

Introduction to Management:

Management - Concept and Meaning - Nature-Functions - Management as a Science and Art and both. Schools of Management Thought - Taylor‘s Scientific Theory-Henry Fayol‘s principles - Elton Mayo‘s Human Relations - **Organizational Designs** - Line Organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee Form of Organization - Social Responsibilities of Management.

UNIT – II

Operations Management:

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control- **Material Management** - Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - **Marketing Management** - Concept - Meaning - Nature-Functions of Marketing - Marketing Mix - Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on Product Life Cycle.

UNIT III

Human Resources Management (HRM):

HRM - Definition and Meaning – Nature - Managerial and Operative Functions - Job Analysis - Human Resource Planning(HRP) - Employee Recruitment-Sources of Recruitment - Employee Selection - Process - Employee Training and Development - Methods - Performance Appraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration.

UNIT IV

Strategic & Project Management:

Definition& Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis - **Project Management** - Network Analysis - Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project within given time - Project Cost- Analysis - Project Crashing (Simple problems).

UNIT V

Contemporary Issues In Management:

Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management(SCM) - Enterprise Resource Planning (ERP) - Performance Management – Employee Engagement and Retention - Business Process Re-engineering and Bench Marking - Knowledge Management – Change Management –Sustainability and Corporate Social Responsibility

TEXT BOOKS

1. Frederick S. Hillier, Mark S. Hillier, *Introduction to Management Science*, October 26, 2023.
2. A.R Aryasri, *Management Science*, TMH, 2019

REFERENCE BOOKS

1.Stoner, Freeman, Gilbert, *Management*, Pearson Education, New Delhi, 2019.
2.Koontz & Weihrich, *Essentials of Management*, 6th Edition, TMH, 2005.
3.Thomas N. Duening & John M. Ivancevich, *Management Principles and Guidelines*, Biztantra.
4.Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2004.
5.Samuel C. Certo, *Modern Management*, 9th Edition, PHI, 2005.

ONLINE RESOUECES:

1.https://www.slideshare.net/slideshow/introduction-to-management-and-organization-231308043/231308043
2. https://nptel.ac.in/courses/112107238
3. https://archive.nptel.ac.in/courses/110/104/110104068/
4. https://archive.nptel.ac.in/courses/110/105/110105069/
5. https://onlinecourses.nptel.ac.in/noc24_mg112/

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(23CS0542) SOFTWARE ARCHITECTURE & DESIGN PATTERNS
(Professional Elective course–IV)

COURSE OBJECTIVES

The course is designed to

1. *To under stand the concept of patterns and the Catalog.*
2. *To discuss the Presentation tier design patterns and their affect on: sessions, client access, validation and consistency.*
3. *To understand the variety of implemented bad practices related to the Business and Integration tiers.*

COURSE OUTCOMES

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

1. *To highlight the evolution of patterns.*
2. *To learn how to add functionality to designs while minimizing complexity*
3. *To learn what design patterns really are, and are not*
4. *To know about specific design patterns.*
5. *To learn how to use design patterns to keep quality high without over design.*
6. *Design software systems using appropriate architecture and design patterns to improve modularity, scalability, and maintainability.*

UNIT-I

Envisioning Architecture:

The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views. Creating an Architecture: Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

UNIT- II

Analyzing Architectures:

Architecture Evaluation, Architecture design decision making, ATAM, CBAM. Moving from one system to many: Software Product Lines, Building systems from off the shelf components, Software architecture in future.

UNIT- III

Patterns:

Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage.Creational and Structural patterns: Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, flyweight.

UNIT- IV

Behavioural patterns:

Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy. template method, visitor.

UNIT- V

Case Studies:

A-7E,A case study in utilizing architectural structures, The World Wide Web - a case study in interoperability, Air Traffic Control,a case study in designing for high availability, Celsius Tech,a case study in product line development.

TEXTBOOKS

1. Len Bass, Paul Clements, and Rick Kazman, *Software Architecture in Practice*, 2nd Edition, Pearson Education, 2003.
2. Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides, *Design Patterns: Elements of Reusable Object-Oriented Software*, Pearson Education.

REFERENCES BOOKS:

1. Luke Hohmann, *Beyond Software Architecture*, Addison-Wesley, 2003.
2. David M. Dikel, David Kane, and James R. Wilson, *Software Architecture*, Prentice Hall PTR, 2001.
3. David Budgen, *Software Design*, 2nd Edition, Pearson Education, 2003.
4. Eric Freeman and Elisabeth Freeman, *Head First Design Patterns*, O'Reilly, 2007.
5. Steven John Metsker and William C. Wake, *Design Patterns in Java*, Pearson Education, 2006.
6. Deepak Alur, John Crupi, and Dan Malks, *J2EE Patterns*, Pearson Education, 2003.
7. Steven John Metsker, *Design Patterns in C#*, Pearson Education, 2004.
8. Frank Buschmann et al., *Pattern-Oriented Software Architecture*, John Wiley & Sons.

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(23CS0543) BLOCK CHAIN TECHNOLOGY
(Professional Elective Course –IV)

COURSE OBJECTIVES

The course is designed to

1. *Understand how block chain systems (mainly Bit coin and Ethereum) work and to securely interact with them.*
2. *Design, build, and deploy smart contracts and distributed applications.*
3. *Integrate ideas from block chain technology into their own projects.*

COURSE OUTCOMES:

After completion of the course, students will be able to

1. *Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding.*
2. *Identify the risks involved in building Block chain applications.*
3. *Review of legal implications using smart contracts.*
4. *Choose the present landscape of Blockchain implementations and Understand Crypto currency markets*
5. *Examine how to profit from trading crypto currencies*
6. *Design and develop decentralized applications (DApps) using blockchain platforms*

UNIT-I

Introduction

Introduction, Scenarios, Challenges Articulated, Block chain, Block chain Characteristics, Opportunities Using Block chain, History of Block chain. Evolution of Block chain: Evolution of Computer Applications, Centralized Applications, Decentralized Applications, Stages in Block chain Evolution, Consortia, Forks, Public Block chain Environments, Type of Players in Block chain Ecosystem, Players in Market.

UNIT-II

Block chain Concepts

Block chain Concepts: Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on block chain, data storage on block chain, wallets, coding on block chain: smart contracts, peer-to-peer network, types of block chain nodes, risk associated with bloc chain solutions, life cycle of block chain transaction.

UNIT-III

Architecting Block chain solutions

Architecting Block chain solutions: Introduction, Obstacles for Use of Block chain, Block chain Relevance Evaluation Framework, Block chain Solutions Reference Architecture, Types of Block chain Applications. Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of Block chain Solutions, Architecture Considerations, Architecture with Block chain Platforms, Approach for Designing Block chain Applications

UNIT-IV

Ethereum Block chain Implementation

Ethereum Block chain Implementation: Introduction, Tuna Fish Tracking Use Case, Ethereum Ecosystem, Ethereum Development, Ethereum Tool Stack, Ethereum Virtual Machine, Smart Contract Programming, Integrated Development Environment, Truffle Framework, Ganache, Unit Testing, Ethereum Accounts, My Ether Wallet, Ethereum Networks/Environments, Infura, Ether scan, Ethereum Clients, Decentralized Application, Metamask, Tuna Fish Use Case Implementation, Open Zeppel in Contracts

UNIT - V

Hyper ledger Block chain Implementation

Hyper ledger Implementation: Introduction, Use Case,Car Ownership Tracking, Hyper ledger Fabric, Hyper ledger Fabric Transaction Flow, FabCar Use Case Implementation, Invoking Chain code Functions Using Client Application.

Advanced Concepts in Block chain: Introduction, Inter Planetary File System (IPFS), Zero Knowledge Proofs, Oracles, Self-Sovereign Identity, Block chain with IoT and AI/ML Quantum Computing and Block chain, Initial Coin Offering, Block chain Cloud Offerings, Block chain and its Future Potential.

TEXT BOOKS:

1. Ambadas, Arshad Sarfarz Ariff, and Sham, *Blockchain for Enterprise Application Developers*, Wiley, 2020.
2. Andreas M. Antonopoulos, *Mastering Bitcoin: Programming the Open Blockchain*, O'Reilly Media, 2017.

REFERENCE BOOKS:

1. Joseph Bambara and Paul R. Allen, *Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions*, McGraw Hill.
2. Melanie Swan, *Blockchain: Blueprint for a New Economy*, O'Reilly Media.

ONLINE LEARNING RESOURCES:

https://github.com/blockchainedindia/resources

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(23CI0609) GENERATIVE AI
(Professional Elective course (PEC) –IV)

COURSE OBJECTIVES:

1. *Understand the basics of Generative AI.*
2. *Know the basics of Text Generation.*
3. *Understand the process of generating videos.*
4. *Know about GAN and its variants.*

Course Outcomes (CO):

After completion of the course, students will be able to

1. *Differentiate and explain fundamental concepts of generative AI.*
2. *Apply and analyze generative models for text generation*
3. *Implement and evaluate generative models for image creation*
4. *Explore and utilize advanced generative techniques for diverse creative applications*
5. *Train, fine-tune, and deploy open-source generative models and programming frameworks*
6. *Critically assess the ethical implications and responsible AI practices*

UNIT I :

Introduction To Gen Ai: Historical Overview of Generative modelling, Difference between Gen AI and Discriminative Modeling, Importance of generative models in AI and Machine Learning, Types of Generative models, GANs, VAEs, autoregressive models and Vector quantized Diffusion models, Understanding if probabilistic modeling and generative process, Challenges of Generative Modeling, Future of Gen AI, Ethical Aspects of AI, Responsible AI, Use Cases.

UNIT II:

Generative Models For Text: Language Models Basics, Building blocks of Language models, Transformer Architecture, Encoder and Decoder, Attention mechanisms, Generation of Text, Models like BERT and GPT models, Generation of Text, Autoencoding, Regression Models, Exploring ChatGPT, Prompt Engineering: Designing Prompts, Revising Prompts using Reinforcement Learning from Human Feedback (RLHF), Retrieval Augmented Generation, Multimodal LLM, Issues of LLM like hallucination.

UNIT III:

Generation of Images: Introduction to Generative Adversarial Networks, Adversarial Training Process, Nash Equilibrium, Variational Autoencoders, Encoder-Decoder Architectures, Stable Diffusion Models, Introduction to Transformer-based Image Generation, CLIP, Visual Transformers ViT- Dall-E2 and Dall-E3, GPT-4V, Issues of Image Generation models like Mode Collapse and Stability.

UNIT IV:

Generation of Painting, Music, and Play: Variants of GAN, Types of GAN, Cyclic GAN, Using Cyclic GAN to Generate Paintings, Neural Style Transfer, Style Transfer, Music Generating RNN, MuseGAN, Autonomous agents, Deep Q Algorithm, Actor-critic Network.

UNIT V:

Open Source Models And Programming Frameworks: Training and Fine tuning of Generative models, GPT 4 All, Transfer learning and Pretrained models, Training vision models, Google Copilot, Programming LLM, LangChain, Open Source Models, Llama, Programming for TimeSformer, Deployment, Hugging Face.

Text Books:

1. Denis Rothman, “Transformers for Natural Language Processing and Computer Vision”, Third Edition , Packt Books, 2024

Reference Books:

1. David Foster, ”Generative Deep Learning”, O’Reily Books, 2024.
2. Altaf Rehmani, “Generative AI for Everyone”, BlueRose One, 2024.

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(23CS0545) INTERNET OF THINGS
(Professional Elective course–IV)

COURSE OBJECTIVES

The course is designed to

1. *Understand the basics of Internet of Things and protocols.*
2. *Discuss the requirement of IoT technology*
3. *Introduce some of the application areas where IoT can be applied.*
4. *Understand the vision of IoT from a global perspective, understand its applications, determine its market perspective using gateways, devices and data management*

COURSE OUTCOMES

After completion of the course, students will be able to

1. *Understand general concepts of Internet of Things.*
2. *Apply design concept to IoT solutions*
3. *Analyze various M2M and IoT architectures*
4. *Evaluate design issues in IoT applications*
5. *Create IoT solutions using sensors, actuators and Devices*
6. *Demonstrate the use of communication protocols and data handling techniques in IoT systems*

UNIT- I

Introduction to IoT

Definition and Characteristics of IoT, physical design of IoT, IoT protocols, IoT communication models, IoT Communication APIs, Communication protocols, Embedded Systems, IoT Levels and Templates

UNIT- II

Prototyping IoT Objects using Microprocessor/Microcontroller

Working principles of sensors and actuators, setting up the board,Programming for IoT, Reading from Sensors, Communication: communication through Bluetooth, Wi-Fi.

UNIT-III

IoT Architecture and Protocols

Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, Protocols- 6LowPAN, RPL, CoAP, MQTT, IoT frameworks- Thing Speak.

UNIT- IV

Device Discovery and Cloud Services for IoT

Device discovery capabilities- Registering a device, Deregister a device, Introduction to Cloud Storage models and communication APIs Web-Server, Web server for IoT.

UNIT- V

UAV IoT

Introduction to Unmanned Aerial Vehicles/Drones, Drone Types, Applications: Defense, Civil, Environmental Monitoring; UAV elements and sensors- Arms, motors, Electronic Speed Controller(ESC), GPS, IMU, Ultra sonic sensors; UAV Software –Arudpilot, Mission Planner, Internet of Drones(IoD)- Case study FlytBase.

TEXT BOOKS:

1. Vijay Madisetti and Arshdeep Bahga, *Internet of Things (A Hands-on Approach)*, 1st Edition, VPT, 2014.
2. K. Valavanis and George J. Vachtsevanos, *Handbook of Unmanned Aerial Vehicles*, Springer, Boston, Massachusetts: Credo Reference, 2016.

REFERENCE BOOKS:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, *From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence*, 1st Edition, Academic Press, 2014.
2. Arshdeep Bahga, Vijay Madisetti, *Internet of Things: A Hands-On Approach*, Universities Press, 2014.
3. Pethuru Raj, Anupama C. Raman, *The Internet of Things: Enabling Technologies and Use Cases*, CRC Press.
4. Francis daCosta, *Rethinking the Internet of Things: A Scalable Approach to Connecting Everything*, 1st Edition, Apress Publications, 2013.
5. Cuno Pfister, *Getting Started with the Internet of Things*, O'Reilly Media, 2011. ISBN: 978-1-4493-9357-1.
6. *DGCA RPAS Guidance Manual*, Revision 3, 2020.
7. John Baichtal, *Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs*, Que Publishing.

ONLINE LEARNING RESOURCES:

1. https://www.arduino.cc/
2. https://www.raspberrypi.org/
3. https://nptel.ac.in/courses/106105166/5
4. https://nptel.ac.in/courses/108108098/4

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(23CS0546) AGILE METHODOLOGIES
(Professional Elective course –V)

COURSE OBJECTIVES

The course is designed to

1. *To provide students with a theoretical as well as practical under standing of agile software development practices and how small teams can apply them to create high-quality software.*
2. *To provide good under standing of software design and a set of software technologies and APIs.*
3. *To carry out detailed examination and demonstration of Agile development and testing techniques.*
4. *To discuss Agile software development*

COURSE OUTCOMES:

After completion of the course, students will be able to

1. *Realize the importance of interacting with business stakeholders in determining the requirements for a software system*
2. *Perform iterative software development processes: how to plan them, how to execute them.*
3. *Point out the impact of social aspects on software development success.*
4. *Develop techniques and tools for improving team collaboration and software quality.*
5. *Perform Software process improvement as an ongoing task for development teams.*
6. *Show how agile approaches can be scaled up to the enterprise level.*

UNIT I

AGILE METHODOLOGY

Theories for Agile Management,Agile Software Development,Traditional Model vs. Agile Model - Classification of Agile Methods,Agile Manifesto and Principles,Agile Project Management,Agile Team Interactions,Ethics in Agile Teams - Agility in Design, Testing,Agile Documentations,Agile Drivers, Capabilities and Values

UNIT II

AGILE PROCESSES

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview,Lifecycle,Work Products, Roles and Practices.

UNIT III

AGILITY AND KNOWLEDGE MANAGEMENT

Agile Information Systems,Agile Decision Making - Earl_S Schools of KM,Institutional

Knowledge Evolution Cycle,Development, Acquisition, Refinement, Distribution, Deployment, Leveraging,KM in Software Engineering,Managing Software Knowledge,Challenges of Migrating to Agile Methodologies,Agile Knowledge Sharing,Role of Story-Cards,Story-Card Maturity Model (SMM).

UNIT IV

AGILITY AND REQUIREMENTS ENGINEERING

Impact of Agile Processes in RE–Current Agile Practices,Variance,Overview of RE Using Agile Managing Unstable Requirements,Requirements Elicitation,Agile Requirements Abstraction Model,Requirements Management in Agile Environment, Agile Requirements Prioritization,Agile Requirements Modeling and Generation,Concurrency in Agile Requirements Generation.

UNIT V

AGILITY AND QUALITY ASSURANCE

Agile Product Development,Agile Metrics,Feature Driven Development (FDD),Financial and Production Metrics in FDD,Agile Approach to Quality Assurance - Test Driven Development,Agile Approach in Global Software Development.

TEXT BOOKS:

1. David J. Anderson and Eli Schragenheim, *Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results*, Prentice Hall, 2003.
2. Hazza and Dubinsky, *Agile Software Engineering*, Series: Undergraduate Topics in Computer Science, Springer, 2009.

REFERENCE BOOKS*:*

1. Craig Larman, *Agile and Iterative Development: A Manager's Guide*, Addison-Wesley, 2004.
2. Kevin C. Desouza, *Agile Information Systems: Conceptualization, Construction, and Management*, Butterworth-Heinemann, 2007.

ONLINE LEARNING RESOURCES:

https://www.nptelvideos.com/video.php?id=904

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(23CS0547) METAVERSE
(Professional Elective course –V)

COURSE OBJECTIVES

The course is designed to

1. *Present and discuss Metaverse characteristics, concepts and layers.*
2. *Explain and analyse Metaverse technologies, tools, platforms, and applications.*
3. *Discuss design theories and practices relevant to the Metaverse.*
4. *Explore cyber security and cybercrime in the Metaverse.*
5. *Examine open challenges in the Metaverse.*

COURSE OUTCOMES

After completion of the course students are expected to be able to

1. *Under stand the characteristics, and interdisciplinary nature of the Metaverse, the opportunities and risks it presents.*
2. *Analyze Metaverse layers, the technologies used in creating them, as well as design theories and practices for Metaverse.*
3. *Examine and discuss Metaverse platforms, applications and the latest technological developments in this area.*
4. *Identify cyber security issues, understand cybercrime, and discuss the open challenges.*
5. *Building Metaverse Applications*
6. *Evaluate the social, ethical, and economic implications of Metaverse technologies on individuals and society*.

UNIT-1

Metaverse fundamentals:

Metaverse evolution, Metaverse importance and characteristics, the interdisciplinary nature of the Metaverse, Metaverse opportunities and risks, Computer-mediated communication (social presence theory, social information processing theory, media richness theory, cyborg theory), Avatar-mediated communication.

UNIT-2

The seven layers of Metaverse:

ExperienceDiscovery, Creator economy, Spatial computing, Decentralization, Human interface, **Infrastructure Metaverse Technologies part I:** AR/VR/MR/XR, 3D reconstruction, Game engines, Smart glasses, wearables, haptic devices, headsets and headwear.

UNIT-3

Metaverse technologies part II:

Blockchain, smart contracts, tokens, NFTs, Cryptography, Artificial Intelligence (AI), Internet of Things (IoT), Edge computing and 5G, 6G. **Design theories and practices:** Social presence and co-presence, Motion sickness and cybersickness, Uncanny valley, Sense of self- location, sense of agency and sense of body ownership, Universal simulation principle, Prototyping, Evaluation techniques (qualitative and quantitative).

UNIT-4

Tools and technologies for Metaverse UX and UI:

Tools and services for avatar systems, Spatial user interface design, Cross-platform user experience design, Multimodal user interface, Technologies and devices for human computer interaction in Metaverse, **Metaverse platforms:** Decentraland, SANDBOX, Roblox, Axie Infinity, uHive, Hyper Nation, Nakamoto (NAKA), Metahero (HERO), Star Atlas (ATLAS), Bloktopia (BLOK), Stageverse, Spatial, PalkaCity, Viverse, Sorare, Illuvium, Upland, Second Life, Sansar, Sensorium Galaxy

UNIT-5

Metaverse applications - part I:

Gaming and entertainment, Travel and tourism, Education and learning, Remote working, Commerce and business, **Metaverse applications - part II:** Real estate, Banking and Finance, Healthcare, Social media, Fashion, Metaverse and cyber security: Cyber security concerns in Metaverse: Social engineering attacks, Data theft, Decentralization vs vulnerabilities, Cyber security risks in Metaverse: process, people, technology, **Metaverse and cybercrime:** Scam and theft, Rug pull, Money manipulation and wash trading, Money laundering, Metaverse challenges and open issues: Persistency, Interoperability and scalability, Maturity, Regulation, Usefulness and ease-of-use, Privacy and data security, Content creation, NFTs and creator economy, Social, legal and ethical issues in the Metaverse

TEXT BOOKS

1. Winters, Terry. The Metaverse. *Independently published, 2021. ISBN: 979-8450959283*
2. Ball, M. (2022). *The Metaverse and How It Will Revolutionize Everything*. Liveright. ISBN: 978-1324092032.

REFERENCE BOOKS:

1. Ball, M. (2022). *The Metaverse and How It Will Revolutionize Everything*. Liveright. ISBN: 978-1324092032.
2. Damar, M. (2021). Metaverse shape of your life for future: A bibliometric snapshot. *Journal of Metaverse*, *1*(1), 1–8.
3. Day, J. (2022). Metaverse will see cyber warfare attacks unlike anything before: 'Massively elevated'. *Express*, February 28. Retrieved from:

https://www.express.co.uk/news/science/1570844/metaverse-news-cyber-warfare-attacks-virtual-worlds-russia-china-spt

4. Polyviou, A., Sharma, K., & Pappas, I. O. (2023). Training in the metaverse: Employing physiological data to improve how we build metaverses for businesses. In *The Next Generation Internet: The Role of Metaverses, AR, VR, MR, and Digital Twins*. Temple University Institute for Business and Information Technology. Link: https://ibit.temple.edu/nextgenerationinternet
5. QuHarrison, T., & Keeney, S. (2022). *The Metaverse Handbook: Innovating for the Internet's Next Tectonic Shift*. Wiley. ISBN: 978-1119892526.
6. Themistocleous, M., Christodoulou, K., & Katelaris, L. (2023). An educational metaverse experiment: The first on-chain and in-Metaverse academic course. *Information Systems. EMCIS2022. Lecture Notes in Business Information Processing*, Springer, Cham.

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(23CS0548) COMPUTER VISION
(Professional Elective Course –V)

COURSE OBJECTIVES

The objective of this course is to understand the basic issues in computer vision and major approaches to address the methods to learn the Linear Filters, segmentation by clustering, Edge detection, Texture.

COURSE OUTCOMES

After completing the course, you will be able to:

1. *Identify basic concepts, terminology, theories, models and methods in the field of computer vision,*
2. *Describe known principles of human visual system,*
3. *Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition,*
4. *Suggest a design of a computer vision system for a specific problem.*
5. *Implement fundamental computer vision algorithms using tools and libraries such as OpenCV, and evaluate their performance on image and video data.*
6. *Analyze real-world applications of computer vision in areas such as surveillance, medical imaging, autonomous vehicles, and robotics*

UNIT-I
LINEAR FILTERS

Introduction to Computer Vision, Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing Filters as Templates, Technique: Normalized Correlation and Finding Patterns, Technique: Scale and Image Pyramids.

UNIT-II
EDGE DETECTION

Noise- Additive Stationary Gaussian Noise, Why Finite Differences Respond to Noise, Estimating Derivatives - Derivative of Gaussian Filters, Why Smoothing Helps, Choosing a Smoothing Filter, Why Smooth with a Gaussian? Detecting Edges-Using the Laplacian to Detect Edges, Gradient-Based Edge Detectors, Technique: Orientation Representations and Corners.

UNIT-III
TEXTURE

Representing Texture –Extracting Image Structure with Filter Banks, Representing Texture using the Statistics of Filter Outputs, Analysis (and Synthesis) Using Oriented Pyramids –The Laplacian

Pyramid, Filters in the Spatial Frequency Domain, Oriented Pyramids, Application: Synthesizing Textures for Rendering, Homogeneity, Synthesis by Sampling Local Models, Shape from Texture, Shape from Texture for Planes.

UNIT-IV

SEGMENTATION BY CLUSTERING

What is Segmentation, Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction. Image Segmentation by Clustering Pixels, Segmentation by Graph- Theoretic Clustering. The Hough Transform, Fitting Lines, Fitting Curves

UNIT-V

RECOGNIZATION BY RELATIONS BETWEEN TEMPLATES

Finding Objects by Voting on Relations between Templates, Relational Reasoning Using Probabilistic Models and Search, Using Classifiers to Prune Search, Hidden Markov Models, Application: HMM and Sign Language Understanding, Finding People with HMM.

TEXT BOOKS:

1. David A. Forsyth, Jean Ponce, *Computer Vision,A modern Approach*, PHI, 2003.

REFERENCE BOOKS:

1. Geometric Computing with Clifford Algebras: *Theoretical Foundations and Applications in Computer Vision and Robotics,* Springer;1 edition,2001by Sommer.
2. *Digital Image Processing and Computer Vision*,1/e, by Sonka.
3. *Computer Vision and Applications: Concise Edition* (With CD) by Jack Academy Press, 2000.

ONLINE LEARNING RESOURCES:

https://nptel.ac.in/courses/106105216https://nptel.ac.in/courses/108103174

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(23CS0559) CYBER PHYSICAL SYSTEMS
(Professional Elective course–V)

COURSE OBJECTIVE:

The objective of this course is to provide students with a comprehensive understanding of the various techniques and methodologies used to design, secure, synchronize, and schedule operations within **Cyber- Physical Systems (CPS)**. The course will cover symbolic synthesis for CPS, security aspects, distributed synchronization, real-time scheduling, and model integration, with an emphasis on both basic principles and advanced techniques.

COURSE OUT COMES:

Upon the Successful Completion of the Course, the Students would be able to:

1. *Understand the core principles behind CPS*
2. *Identify Security mechanisms of Cyber physical systems*
3. *Under stand Synchronization in Distributed Cyber-Physical Systems*
4. *To Understand the Scheduling for Cyber-Physical Systems*
5. *To understand the various Cyber-Physical System models*
6. *Analyze real-time communication protocols and their role in ensuring reliability and efficiency in Cyber-Physical Systems*

UNIT - I

Symbolic Synthesis for Cyber-Physical Systems

Introduction and Motivation, Basic Techniques - Preliminaries, Problem Definition, Solving the Synthesis Problem, Construction of Symbolic Models, Advanced Techniques: Construction of Symbolic Models, Continuous-Time Controllers, Software Tools

UNIT - II

Security of Cyber-Physical Systems

Introduction and Motivation, Basic Techniques - Cyber Security Requirements, Attack Model, Countermeasures, Advanced Techniques: System Theoretic Approaches

UNIT - III

Synchronization in Distributed Cyber-Physical Systems:

Challenges in Cyber-Physical Systems, A Complexity-Reducing Technique for Synchronization,

Formal Software Engineering, Distributed Consensus Algorithms, Synchronous Lockstep Executions, Time-Triggered Architecture, Related Technology, Advanced Techniques

UNIT - IV

Real-Time Scheduling for Cyber-Physical Systems

Introduction and Motivation, Basic Techniques - Scheduling with Fixed Timing Parameters, Memory Effects, Multiprocessor/Multicore Scheduling, Accommodating Variability and Uncertainty

UNIT - V

Model Integration in Cyber-Physical Systems

Introduction and Motivation, Causality, Semantic Domains for Time, Interaction Models for Computational Processes, Semantics of CPS DSMLs, Advanced Techniques, For Spec, The Syntax of CyPhyML, Formalization of Semantics, Formalization of Language Integration.

TEXT BOOKS:

1. Raj Raj kumar, Dion is io De Niz, and Mark Klein, *Cyber-Physical Systems*, Addison-Wesley Professional.
2. Rajeev Alur, *Principles of Cyber-Physical Systems*, MIT Press, 2015

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(23CE0154) BUILDING MATERIALS AND SERVICES
(Open Elective–III)

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the properties, classifications, and applications of building materials like stones, bricks, tiles, wood, aluminum, glass, paints, and plastics.*
2. *Analyze the composition, manufacturing process, and properties of cement and admixtures.*
3. *Apply knowledge of building components such as lintels, arches, walls, stairs, floors, roofs, foundations, and joinery.*
4. *Evaluate masonry, mortars, finishing techniques, and formwork systems.*
5. *Assess various building services including plumbing, ventilation, air conditioning, acoustics, and fire protection.*

COURSE OUTCOMES (COs)

Upon successful completion of this course, students will be able to:

1. *Identify and classify construction materials and select materials appropriately for construction use*
2. *Analyze physical and laboratory test of cement and select appropriate admixtures based on desired performances*
3. *Identify and describe the functions, types, and structural aspects of essential building components such as lintels, arches, walls, vaults, staircases, floors, and roofs.*
4. *Apply appropriate materials and construction techniques in the design of building components including joinery ,doors and windows and foundations, considering functional and structural requirements*
5. Design *temporary supporting systems including formwork, scaffolding, shoring, and underpinning as per site conditions and structural needs*
6. Apply principles of acoustics *to evaluate sound absorption and develop suitable acoustic design solutions for different building types*

UNIT -I

Stones and Bricks, Tiles:

Building Stones - Classifications and Quarrying - Properties - Structural Requirements - Dressing. Bricks - Composition of Brick Earth - Manufacture and Structural Requirements, Fly Ash, Ceramics. Timber, Aluminum, Glass, Paints and Plastics: Wood - Structure - Types and Properties - Seasoning - Defects; Alternate Materials for Timber - GI / Fiber - Reinforced Glass Bricks, Steel & Aluminum, Plastics.

UNIT -II

Cement & Admixtures:

Types of Cement - Ingredients of Cement - Manufacture - Chemical Composition - Hydration - Field & Lab Tests - Fineness - Consistency - Initial &Final Setting - Soundness . Admixtures - Mineral & Chemical Admixtures - Uses

UNIT -III

Building Components:

Lintels, Arches, Walls, Vaults - Stair Cases - Types of Floors, Types of Roofs - Flat, Curved, Trussed; Foundations - Types; Damp Proof Course; Joinery - Doors - Windows - Materials - Types.

UNIT -IV

Mortars, Masonry and Finishing's Mortars:

Lime and Cement Mortars Brick Masonry - Types - Bonds; Stone Masonry - Types; Composite Masonry - Brick-Stone Composite; Concrete, Reinforced Brick. Finishers: Plastering, Pointing, Painting, Claddings - Types - Tiles - ACP form Work: Types: Requirements - Standards - Scaffolding - Design; Shoring, Underpinning.

UNIT -V

Building Services:

Plumbing Services: Water Distribution, Sanitary - Lines &Fittings; Ventilations: Functional Requirements Systems of Ventilations. Air-Conditioning - Essentials and Types; Acoustics - Characteristic - Absorption - Acoustic Design; Fire Protection - Fire Hazards - Classification of Fire Resistant Materials and Constructions

TEXT BOOKS

1. Arora & Bindra, *Building Materials and Construction*, Dhanpat Roy Publications, 1st Edition, 2010.
2. G C Sahu, Joygopal Jena, *Building Materials and Construction,* McGraw-Hill Pvt Ltd, 1st Edition, 2015.

REFERENCES

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar, *Building Construction*, Jain - Laxmi Publications (P) Ltd., New Delhi
2. P. C. Varghese, *Building Materials*, Prentice Hall of India, 2015.
3. N.Subramanian, *Building Materials Testing and Sustainability*, Oxford Higher Education, 2019.
4. R. Chudley, *Construction Technology*, Longman Publishing Group, 1973.
5. S. K. Duggal, *Building Materials,* Oxford & IBH Publishing Co. Ltd., New Delhi, 2019

ONLINE LEARNING RESOURCES

https://archive.nptel.ac.in/courses/105/102/105102088/

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(23CE0155) ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective –III)

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the principles, methodologies, and significance of Environmental Impact Assessment (EIA).*
2. *Analyze the impact of developmental activities on land use, soil, and water resources.*
3. *Evaluate the impact of development on vegetation, wildlife, and assess environmental risks.*
4. *Develop environmental audit procedures and assess compliance with environmental regulations.*
5. *Understand and apply environmental acts, notifications, and legal frameworks in EIA studies.*

COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

1. *Evaluate different EIA methods and use cost/benefit analysis to help in project decision-making.*
2. *Identify the impacts of developmental activities on land, water, air, and biological environment, and suggest suitable mitigation measures.*
3. *Understand the impacts of developmental activities and deforestation on vegetation and wildlife.*
4. *Apply the principles of environmental risk assessment to identify potential risks and suggest appropriate mitigation strategies.*
5. *Apply environmental audit procedures and analyze audit data to prepare a report in accordance with environmental regulations.*
6. *Analyze environmental rules, EIA steps, and ISO 14000 to understand how they help in pollution control and reporting.*

UNIT -I

Concepts and Methodologies of EIA:

Initial Environmental Examination, Elements of EIA, - Factors Affecting EIA, Impact Evaluation and Analysis, Preparation of Environmental Base Map, Classification of Environmental Parameters - Criteria for the Selection of EIA Methodology, EIA Methods, Ad-Hoc Methods, Matrix Methods, Network Method Environmental Media Quality Index Method, Overlay Methods and Cost/Benefit Analysis.

UNIT -II

Impact of Developmental Activities and Land Use:

Introduction and Methodology for The Assessment of Soil and Ground Water, Delineation of Study Area, Identification of Activities. Procurement of Relevant Soil Quality, Impact Prediction, Assessment of Impact Significance, Identification and Incorporation of Mitigation Measures

EIA in Surface Water, Air and Biological Environment: Methodology for the Assessment of Impacts on Surface Water Environment, Air Pollution Sources, Generalized Approach for Assessment of Air Pollution Impact.

UNIT -III

Assessment of Impact on Vegetation, Wildlife and Risk Assessment:

Introduction - Assessment of Impact of Development Activities on Vegetation and Wildlife, Environmental Impact of Deforestation,Causes and Effects of Deforestation - Risk Assessment and Treatment of Uncertainty - Key Stages in Performing Environmental Risk Assessment-Advantages of Environmental Risk Assessment.

UNIT -IV

Environmental Audit:

Introduction - Environmental Audit & Environmental Legislation Objectives of Environmental Audit, Types of Environmental Audit, Audit Protocol, Stages of Environmental Audit, Onsite Activities, Evaluation of Audit Data and Preparation of Audit Report

UNIT -V

Environmental Acts and Notifications:

The Environmental Protection Act, The Water Preservation Act, The Air (Prevention & Control of Pollution Act), Wild Life Act - Provisions in The EIA Notification, Procedure for Environmental Clearance, Procedure for Conducting Environmental Impact Assessment Report- Evaluation of EIA Report. Environmental Legislation Objectives, Evaluation of Audit Data and Preparation of Audit Report, Post Audit Activities, Concept of ISO and ISO 14000

TEXT BOOKS

1. Y. Anjaneyulu, *Environmental Impact Assessment Methodologies*, B.S.Publication, Hyderabad, 2nd edition, 2011
2. N.S. Raman, A.R.Gajbhiye, S.R.Khandeshwar, *Environmental Impact Assessment*, TechSar Pvt. Ltd., 2nd edition, 2014

REFERENCES

1. K. Suresh Dhaneja, *Environmental Science and Engineering*, S.K., Katania & Sons Publication, New Delhi 2011
2. V.S. Kulkarni, S.N. Kaul & R.K. Trivedy, *A Handbook of Environment Impact Assessment*, Scientific Publishers 2024
3. H. S. Peavy, Rowe, D. R, Tchobanoglous,G, *Environmental Engineering*, McGraw Hill International Editions, New York, 7th edition, 2017

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(23EE0263) SMART GRID TECHNOLOGIES
(Open Elective –III)

COURSE OBJECTIVES

The course is designed to:

1. *To understand concept of smart grid and its advantages over conventional grid*
2. *To know smart metering techniques*
3. *To learn wide area measurement techniques*
4. *To understand the problems associated with integration of distributed generation & its solution through smart grid.*

COURSE OUTCOMES

On successful completion of this course, students will be able to

1. *Understanding the Concept and Evolution of Smart Grids.*
2. *Analyzing Wide Area Monitoring System.*
3. *Analyzing Of Synchrophasor Technology.*
4. *Applying Smart Metering and Advanced Metering Infrastructure (AMI) Concepts.*
5. *Evaluating Information and Communication Technology (ICT) Systems in Smart Grids.*
6. *Designing Smart Grid Applications and Cyber security Measures.*

UNIT I

Introduction to Smart Grid :

Evolution of Electric Grid,Need for Smart Grid,Difference between conventional & smart grid,Overview of enabling technologies,International experience in Smart Grid deployment efforts,Smart Grid road map for India,Smart Grid Architecture.

UNIT II

Wide Area Monitoring System :

Fundamentals of Synchro phasor Technology,concept and benefits of Wide Area Monitoring System,Structure and functions of Phasor Measuring Unit (PMU) and Phasor Data Concentrator (PDC),Road Map for Synchrophasor applications (NAPSI),Operational experience and Blackout analysis using PMU - Case study on PMU.

UNIT III

Smart Meters:

Features and functions of Smart Meters ,Functional specification,category of Smart Meters

,Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) drivers and benefits,AMI protocol,Demand Side Integration: Peak load, Outage and Power Quality management.

UNIT IV

Information and Communication Technology:

Overview of Smart Grid Communication system,Modulation and Demodulation Techniques: Radio Communication ,Mobile Communication ,Power Line Communication ,Optical Fibre Communication,Communication Protocol for Smart Grid.

UNIT V

Smart Grid Applications and Cyber Security:

Applications : Overview and concept of Renewable Integration,Introduction to distributed generation - Role of Protective Relaying in Smart Grid,House Area Network,Advanced Energy Storage Technology: Flow battery,Fuel cell,SMES,Super capacitors,Plug,in Hybrid electric Vehicles - Cyber Security: Security issues in DG, Distribution Automation, AMI, Electric Vehicle Management Systems,Approach to assessment of smart grid cyber security risks,Methodologies. Cyber Security requirements,Smart Grid Information Model.

TEXT BOOKS:

1. James Momoh, *SMART GRID: Fundamentals of Design and Analysis*, John Wiley and Sons, New York, 2012.
2. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, *Smart Grid: Technology and Applications*, John Wiley & Sons, New Jersey, 2012.

REFERENCES BOOKS:

1. Power Grid Corporation of India Limited, *Smart Grid Primer*, 1st Edition, Power Grid Corporation of India Limited, Bangalore, India, 2013.
2. Fereidoon P. Sioshansi, *Smart Grid,Integrating Renewable, Distributed and Efficient Energy*, 1st Edition, Academic Press, USA, 2011.
3. Stuart Borlase, *Smart Grids: Infrastructure, Technology and Solutions*, 1st Edition, CRC Press Publication, England, 2013.
4. A.G. Phadke, J.S. Thorp, *Synchronized Phasor Measurements and Their Applications*, 1st Edition, Springer, New York, 2012.

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(23ME0357) 3D PRINTING TECHNOLOGIES
(Open Elective –III)

COURSE OBJECTIVES :

The objectives of the course are to

1. *Familiarize techniques for processing of CAD models for rapid prototyping.*
2. *Explain fundamentals of rapid prototyping techniques.*
3. *Demonstrate appropriate tooling for rapid prototyping process.*
4. *Focus Rapid prototyping techniques for reverse engineering.*
5. *Train Various Pre Processing, Processing and Post Processing errors in RP Processes.*
6. *Understand the software used STL file handling, post-processing steps, and real-world application challenges in 3D printing systems*

COURSE OUTCOMES

On successful completion of the course, the student will be able to

1. *Use techniques for processing of CAD models for rapid prototyping.*
2. *Understand and apply fundamentals of rapid prototyping techniques.*
3. *Use appropriate tooling for rapid prototyping process.*
4. *Use rapid prototyping techniques for reverse engineering.*
5. *Identify Various Pre Processing, Processing and Post Processing errors in RP processes.*
6. *Demonstrate STL file issues and evaluate the importance of various 3D printing software tools*

UNIT I

Introduction to 3D Printing

Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.

UNIT II

Solid and Liquid Based RP Systems

Working Principle, Materials, Advantages, Limitations and Applications of Fusion Deposition Modelling (FDM), Laminated Object Manufacturing (LOM), Stereo lithography (SLA), Direct Light Projection System (DLP) and Solid Ground Curing (SGC).

UNIT III

Powder Based & Other RP Systems

Powder Based RP Systems: Working Principle, Materials, Advantages, Limitations and Applications of Selective Laser Sintering (SLS), Direct Metal Laser Sintering (DMLS), Laser Engineered Net Shaping (LENS) and Electron Beam Melting (EBM).

Other RP Systems: Working Principle, Materials, Advantages, Limitations and Applications of

Three Dimensional Printing (3DP), Ballastic Particle Manufacturing (BPM) and Shape Deposition Manufacturing (SDM).

UNIT IV Rapid Tooling & Reverse Engineering

Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods.

Reverse Engineering (RE): Meaning, Use, RE, The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development

UNIT V Errors in 3D Printing and Applications:

Pre-processing, processing and post-processing errors, Part building errors in SLA, SLS, etc. Software: Need for software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, Solid View, 3DView, etc., software, Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP. Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

TEXT BOOKS:

1. Chee Kai Chua and Kah Fai Leong., *3D Printing and Additive Manufacturing Principles and Applications*, 5/e, World Scientific Publications, 2017.
2. Ian Gibson, David W Rosen, Brent Stucker., *Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing*, Springer, 2/e, 2010.

REFERENCES BOOKS:

1. Frank W.Liou., *Rapid Prototyping & Engineering Applications*, CRC Press, Taylor & Francis Group, 2011.
2. Rafiq Noorani., *Rapid Prototyping: Principles and Applications in Manufacturing*, John Wiley & Sons, 2006.

Online Learning Resources:

1. NPTEL Course on Rapid Manufacturing.
2. https://nptel.ac.in/courses/112/104/112104265/
3. https://www.hubs.com/knowledge-base/introduction-fdm-3d-printing/
4. https://slideplayer.com/slide/6927137/
5. https://www.mdpi.com/2073-4360/12/6/1334
6. https://www.centropiaggio.unipi.it/sites/default/files/course/material/2013-11-29%20-
7. %20FDM.pdf
8. https://lecturenotes.in/subject/197
9. https://www.cet.edu.in/noticefiles/258_Lecture%20Notes%20on%20RP-ilovepdfcompressed.pdf
10. https://www.vssut.ac.in/lecture_notes/lecture1517967201.pdf
11. https://www.youtube.com/watch?v=NkC8TNts4B4.

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(23HS0856) WAVELET TRANSFORMS AND ITS APPLICATIONS
(Open Elective –III)
(Common to All Branches)

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the wavelet transform as an alternative approach to Fourier Transform*
2. *To understand Multi Resolution Analysis and Wavelet concepts*
3. *To study the wavelet transform in both continuous and discrete domain*
4. *To understand the design of wavelets using Lifting scheme*
5. *To understand the applications of Wavelet transform*

COURSE OUTCOMES

After successful completion of this course, the students should be able to

1. *Understand wavelets and wavelet basis and characterize continuous and discrete wavelet transforms*
2. *Illustrate the multi resolution analysis ad scaling functions*
3. *Implement discrete wavelet transforms with multirate digital filters*
4. *Improve problem solving skills using discrete wavelet transform and filter banks.*
5. *Understand multi resolution analysis and identify various wavelets and evaluate their time frequency resolution properties.*
6. *Design certain classes of wavelets to specification and justify the basis of the application of wavelet transforms to different fields.*

UNIT I

Wavelets

Wavelets and Wavelet Expansion Systems - Wavelet Expansion- Wavelet Transform- Wavelet System- More Specific Characteristics of Wavelet Systems -Haar Scaling Functions and Wavelets - effectiveness of Wavelet Analysis -The Discrete Wavelet Transform- The Discrete-Time and Continuous Wavelet Transforms.

UNIT II

A Multi resolution Formulation of Wavelet Systems

Signal Spaces -The Scaling Function –Multi resolution Analysis - The Wavelet Functions - The Discrete Wavelet Transform- A Parseval's Theorem - Display of the Discrete Wavelet Transform and the Wavelet Expansion.

UNIT III

Filter Banks and the Discrete Wavelet Transform

Analysis - From Fine Scale to Coarse Scale- Filtering and Down-Sampling or Decimating -Synthesis - From Coarse Scale to Fine Scale -Filtering and Up-Sampling or Stretching - Input Coefficients - Lattices and Lifting - -Different Points of View.

UNIT IV

Time-Frequency and Complexity

Multi resolution versus Time-Frequency Analysis- Periodic versus Non periodic Discrete Wavelet Transforms -The Discrete Wavelet Transform versus the Discrete-Time Wavelet Transform- Numerical Complexity of the Discrete Wavelet Transform.

UNIT V

Bases and Matrix Examples

Bases, Orthogonal Bases, and Biorthogonal Bases -Matrix Examples - Fourier Series Example - Sine Expansion Example - Frames and Tight Frames - Matrix Examples -Sine Expansion as a Tight Frame Example.

TEXT BOOK:

1. C. Sidney Burrus and Ramesh A. Gopinath, *Introduction to Wavelets and Wavelet Transforms*, Prentice Hall, 1997.
2. James S. Walker, *A Primer on Wavelets and Their Scientific Applications*, CRC Press, 1999

REFERENCES BOOKS:

1. Raghuveer Rao, *Wavelet Transforms*, Pearson Education Asia.
2. C. Sidney Burrus, Ramose, and Ramesh A. Gopinath, *Introduction to Wavelets and Wavelet Transform*, Prentice Hall Inc.

ONLINE LEARNING RESOURCES

1. http://users.rowan.edu/~polikar/WAVELETS/WTtutorial.html
2. http://www.wavelet.org/
3.http://www.math.hawaii.edu/~dave/Web/Amara's%20Wavelet%20Page.html
4.https://jqichina.wordpress.com/wp-content/uploads/2012/02/ten-lectures-of-waveletsefbc88e5b08fe6b3a2e58d81e8aeb2efbc891.pdf

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(23HS0844) SMART MATERIALS AND DEVICES
(Open Elective –III)
(Common to all branches of Engineering)

COURSE OBJECTIVES

The course is designed to

1. *To provide exposure to smart materials and their engineering applications.*
2. *To impart knowledge on the basics and phenomenon behind the working of smart materials*
3. *To explain the properties exhibited by smart materials.*
4. *To educate various techniques used to synthesize and characterize smart materials.*
5. *To identify the required smart material for distinct applications/devices.*

COURSE OUTCOMES

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

1. *Identify key discoveries that led to modern applications of shape memory materials, describe the two phases in shape memory alloys.*
2. *Describe how different external stimuli (light, electricity, heat, stress, and magnetism) influence smart material properties.*
3. *Summarize various types of synthesis of smart materials*
4. *Analyze the suitable method for synthesis of smart materials*
5. *Analyze various characterization techniques used for smart materials*
6. *Interpret the importance of smart materials in various devices*

UNIT - I

Introduction to Smart Materials

Historical account of the discovery and development of smart materials, Shape memory materials, chromoactive materials, magnetorheological materials, photoactive materials, Polymers and polymer composites (Basics).

UNIT -II

Properties of Smart Materials

Optical, Electrical, Dielectric, Piezoelectric, Ferroelectric, Pyroelectric and Magnetic properties of smart materials.

UNIT -III

Synthesis of Smart Materials

Chemical route: Chemical vapour deposition, Sol-gel technique, Hydrothermal method, Mechanical alloying and Thin film deposition techniques: Chemical etching, Spray pyrolysis.

UNIT -IV

Characterization Techniques

Powder X-ray diffraction, Raman spectroscopy (RS), UV-Visible spectroscopy, Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Atomic force microscopy (AFM).

UNIT -V

Smart Materials based Devices

Devices based on smart materials: Shape memory alloys in robotic hands, piezoelectric based devices, MEMS and intelligent devices.

TEXT BOOKS:

1. Yaser Dahman, *Nanotechnology and Functional Materials for Engineers*, Elsevier, 2017.
2. E. Zschech, C. Whelan, T. Mikolajick, *Materials for Information Technology: Devices, Interconnects and Packaging*, Springer-Verlag London Limited, 2005.

REFERENCE BOOKS:

1. P. Gauenzi, *Smart Structures*, Wiley, 2009.
2. Mahmood Aliofkhazraei, *Handbook of Functional Nanomaterials*, Vol. 1 & 2, Nova Publishers, 2014.
3. Chaudhery Mustansar Hussain, Paolo Di Sia, *Handbook of Smart Materials, Technologies, and Devices: Applications of Industry 4.0*, Springer, 2022.
4. Mohsen Shahinpoor, *Fundamentals of Smart Materials*, Royal Society of Chemistry, 2020.

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(23HS0846) INTRODUCTION TO QUANTUM MECHANICS
(Open Elective–III)
(Common to all branches of Engineering)

COURSE OBJECTIVES
The course is designed to

1. *To understand the fundamental differences between classical and quantum mechanics.*
2. *To study wave-particle duality, uncertainty principle, and their implications.*
3. *To learn and apply Schrödinger equations to basic quantum systems.*
4. *To use operator formalism and mathematical tools in quantum mechanics.*
5. *To explore angular momentum, spin and their quantum mechanical representations.*

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

1.Explain the key principles of quantum mechanics and wave-particle duality
2.Apply Schrödinger equations to solve one-dimensional quantum problems
3.Analyze various types of operators
4.Solve quantum mechanical problems using operator and matrix methods.
5.Evaluate quantum states using Dirac notation and expectation values.
6.Analyze angular momentum and spin systems using Pauli matrices and operators.

UNIT- I
PRINCIPLES OF QUANTUM MECHANICS
Introduction: Limitations of classical Mechanics, Difficulties with classical theories of black body radiation and origin of quantum theory of radiation.Wave-particle duality: de Broglie wavelength, Heisenberg uncertainty principle.Schrödinger time independent and time dependent wave equation, Solution of the time dependent Schrödinger equation, Concept of stationary states, Physical significance of wave function (ψ), Orthogonal, Normalized and Orthonormal functions

UNIT- II
ONE DIMENSIONAL PROBLEMS AND SOLUTIONS
Potential step,Reflection and Transmission at the interface. Potential well: Square well potential with rigid walls, Square well potential with finite walls. Potential barrier: Penetration of a potential barrier (tunneling effect). Periodic potential and Harmonic oscillator, Energy eigen functions and eigen values.

UNIT-III

OPERATOR FORMALISM

Operators, Operator Algebra, Eigen values and Eigen vectors, Postulates of quantum mechanics, Matrix representation of wave functions and linear operators.

UNIT- IV

MATHEMATICAL TOOLS FOR QUANTUM MECHANICS

The concept of row and column matrices, Matrix algebra,Hermitian operators,definition. Dirac‘s bra and ket notation, Expectation values, Heisenberg (operator) representation of harmonic oscillator, Ladder operators and their significance.

UNIT- V

ANGULAR MOMENTUM AND SPIN

Angular momentum operators: Definition. Eigen functions and Eigen values of AM operators. Matrix representation of angular momentum operators, System with spin half(1/2), Spin angular momentum, Pauli‘s spin matrices. Clebsch-Gordon coefficients. Rigid Rotator: Eigen functions and Eigen values.

TEXT BOOKS:

1. Quantum Mechanics. Vol 1, A. Messaia Noth-Holland Pub. Co., Amsterdam,(1961).
2. A Text Book of Quantum Mechanics. P.M.Mathews and K.Venkatesam, Tata McGraw Hill, New Delhi,(1976).
3. Introduction to Quantum Mechanics. R.H.Dicke and J.P.Witke, Addison-Wisley Pub.Co.Inc. ,London, (1960).
4. Quantum Mechanics. S.L.Gupta, V.Kumar, H.V.Sarama and R.C.Sharma, Jai Prakash Nath & Co, Meerut, (1996).

REFERENCE BOOKS:

1. Quantum Mechanics. L.I. Schiff, McGraw Hill Book Co., Tokyo, (1968).
2. Introduction to Quantum Mechanics. Richard L. Liboff, Pearson Education Ltd (Fourth Edn.) 2003.

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(23HS0808) GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT
(Open Elective –III)

COURSE OBJECTIVES
The course is designed to

1. *To understand principle and concepts of green chemistry.*
2. *To understand the types of catalysis and industrial applications.*
3. *To apply green solvents in chemical synthesis*
4. *To enumerate different sourced of green energy.*
5. *To apply alternative greener methods foe chemical reactions*

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

1. *Understand the basic concept and principle of green chemistry.*
2. *Analyze the concept of green chemistry in the catalytic industry.*
3. *Understand the importance of green synthesis.*
4. *Evaluate various recycling methods for green solvents to promote eco-friendly and cost-effective chemical processes.*
5. *Analyze the emerging green technologies in green chemistry.*
6. *Apply alternative green methods for green chemistry.*

UNIT 1
PRINCIPLES AND CONCEPTS OF GREEN CHEMISTRY
Introduction, Green chemistry Principles, sustainable development and green chemistry, E factor, atom economy, atom economic Reactions: Rearrangement and addition reactions and atom un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling

UNIT 2
CATALYSIS AND GREEN CHEMISTRY
Introduction, Types of catalysis, Heterogeneous catalysis: Basics of Heterogeneous Catalysis, Zeolite and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, and Phase transfer catalysis, Bio-catalysis and Photo-catalysis with examples.

UNIT 3

GREEN SOLVENTS IN CHEMICAL SYNTHESIS

Green Solvents: Concept, Tools and techniques for solvent selection, supercritical fluids: Super critical carbondioxide, super critical water, Polyethylene glycol (PEG), Ionic liquids, Recyling of green solvents.

UNIT 4

EMERGING GREENER TECHNOLOGIES

Biomass as renewable resource, Energy: Energy from Biomass, Solar Power, Chemicals from Renewable Feedstock‘s, Chemicals from Fatty Acids, Polymers from Renewable Resources, Alternative Economies: The Syngas Economy, The Biorefinery, Design for energy efficiency, Mechanochemical synthesis.

UNIT 5

ALTERNATIVE GREENER METHODS

Photochemical Reactions - Examples, Advantages and Challenges, Photoredox catalysis, single electron transfer reactions (SET), Examples of Photochemical Reactions, Microwave-assisted Reactions and Sonochemical reactions, examples and applications.

TEXT BOOKS

1. M. Lancaster, *Green Chemistry: An Introductory Text*, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, *Green Chemistry: Theory and Practice*, 4th Edition, Oxford University Press, USA.

REFERENCE BOOKS

1. Sanjay K. Sharma and Ackmez Mudhoo, *Green Chemistry for Environmental Sustainability*, First Edition, CRC Press, 2010.
2. Edited by Alvise Perosa and Maurizio Selva, *Handbook of Green Chemistry, Volume 8: Green Nanoscience*, Wiley-VCH, 2013.

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(23HS0824) EMPLOYABILITY SKILLS
(Open Elective –III)
(Common to all branches)

COURSE OBJECTIVES

The course is designed to

1. *To encourage all-round development of the students by focusing on productive skills.*
2. *To make the students aware of goal setting and writing skills.*
3. *To enable them to know the importance of presentation skills in achieving desired goals.*
4. *To help them develop organizational skills through group activities.*
5. *To function effectively with heterogeneous teams*.

COURSE OUTCOMES

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

1. *Understand the importance of goals and try to achieve them.*
2. *Explain the significance of self-management.*
3. *Apply the knowledge of writing skills in preparing eye-catchy resumes.*
4. *Analyse various forms of presentation skills.*
5. *Judge the group behaviour appropriately.*
6. *Develop skills required for employability.*

UNIT I

Goal Setting and Self-Management

Definition, importance, and types of goal setting. SMART Goal Setting, Advantages. Motivation, Intrinsic and Extrinsic Motivation. Self-Management, Knowing about self. SWOC Analysis (Strengths, Weaknesses, Opportunities, Challenges).

UNIT II

Writing Skills

Definition, significance, and types of writing skills. Resume Writing vs. CV Writing. E-mail Writing, Cover Letters, E-mail Etiquette. Statement of Purpose (SoP).

UNIT III

Technical Presentation Skills

Nature, meaning, and significance of presentation skills. Planning, Preparation, Presentation, Stage Dynamics. Anxiety in Public Speaking (Glossophobia). PPT and Poster Presentation.

UNIT IV

Group Presentation Skills

Body Language. Group Behaviour. Team Dynamics. Leadership Skills. Personality Manifestation. Group Discussion. Debate. Corporate Etiquette.

UNIT V

Job Cracking Skills

Nature, characteristics, importance, and types of interviews. Job Interviews,Skills for success. Job Searching Skills. STAR Method. FAQs. Answering Strategies. Mock Interviews.

TEXTBOOKS

1. Sabina Pillai, Agna Fernandez, *Soft Skills & Employability Skills*, Cambridge Publisher, 2014.
2. Alka Wadkar, *Life Skills for Success*, Sage Publications, 2016.

REFERENCE BOOKS

1. Gangadhar Joshi, *Campus to Corporate*, Sage Publications, 2015.
2. Sherfield, Montgomery, Moody, *Cornerstone: Developing Soft Skills*, 4th Edition, Pearson Publications, 2008.
3. Shikha Kapoor, *Personality Development and Soft Skills,Preparing for Tomorrow*, 1st Edition, Wiley, 2017.
4. M. Sen Gupta, *Skills for Employability*, Innovative Publication, 2019.
5. Steve Duck and David T. McMahan, *The Basics of Communication Skills: A Relational Perspective*, Sage Press, 2012.

ONLINE LEARNING RESOURCES

1. https://youtu.be/gkLsn4ddmTs
2. https://youtu.be/2bf9K2rRWwo
3. https://youtu.be/FchfE3c2jzc
4. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
5. https://www.youtube.com/c/skillopedia/videos
6. https://onlinecourses.nptel.ac.in/noc25_hs96/preview
7. https://onlinecourses.nptel.ac.in/noc21_hs76/preview
8. https://archive.nptel.ac.in/courses/109/107/109107172/#

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(23CE0156) GEO-SPATIAL TECHNOLOGIES
(Open Elective –IV)

COURSE OBJECTIVES

The objectives of this course is to

1. *To understand raster-based spatial analysis techniques, including query, overlay, and cost-distance analysis.*
2. *To analyze vector-based spatial analysis techniques such as topology, overlay, and proximity analysis.*
3. *To apply network analysis techniques for geocoding, shortest path analysis, and location-allocation problems.*
4. *To evaluate surface and geostatistical analysis methods, including terrain modeling, watershed analysis, and spatial interpolation.*
5. *To assess GIS customization, Web GIS, and mobile mapping techniques for real world applications.*

COURSE OUTCOMES

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

1. *Apply raster-based spatial operations such as map algebra, reclassification, and cost-distance analysis to solve basic spatial problems.*
2. *Find and explain spatial relationships in vector data using overlay and buffer tools.*
3. *Construct and evaluate network models to determine optimal paths, service areas, and facility locations using time and distance constraints.*
4. *Work with network data to find shortest routes, service areas, and best locations for facilities.*
5. *Understand and explain terrain features and data patterns using elevation and interpolation methods*
6. *Assess the role of customization, Web GIS, and location-based services in developing efficient and user-specific GIS applications using scripting and big data tools.*

UNIT -I

Raster Analysis:

Raster Data Exploration **-** Query Analysis - Local Operations - Map Algebra, Reclassification, Logical and Arithmetic Overlay Operations - Neighborhood - Operations - Aggregation, Filtering - Extended Neighborhood - Operations - Zonal Operations - Statistical Analysis - Cost-Distance Analysis - Least Cost Path.

UNIT -II

Vector Analysis:

Non-Topological Analysis **-** Attribute Database Query, Structured Query Language, Co-Ordinate

Transformation, Summary Statistics, Calculation of Area, Perimeter and Distance - Topological Analysis - Reclassification, Aggregation, Overlay Analysis: Point-In-Polygon, Line-In-Polygon, Polygon-On-Polygon - Clip, Erase, Identity, Union, Intersection - Proximity Analysis - Buffering

UNIT -III

Network Analysis:

Network - Introduction - Network Data Model - Elements of Network - Building A Network Database - Geocoding - Address Matching - Shortest Path in A Network - Time and Distance Based Shortest Path Analysis - Driving Directions - Closest Facility Analysis - Catchment / Service Area Analysis,Location - Allocation Analysis

UNIT -IV

Surface and Geostatistical Analysis:

Surface Data - Sources of X, Y, Z Data - DEM, TIN - Terrain Analysis - Slope, Aspect, Viewshed, Watershed Analysis: Watershed Boundary, Flow Direction, Flow Accumulation, Drainage Network, Spatial Interpolation: IDW, Spline, Kriging, Variogram

UNIT -V

Customisation, Web GIS, Mobile Mapping:

Customisation of GIS: Need, Uses, Scripting Languages - Embedded Scripts - Use of Python Script - Web GIS: Web GIS Architecture, Advantages of Web GIS, Web Applications - Location Based Services: Emergency and Business Solutions - Big Data Analytics.

TEXT BOOKS

1. Kang,Tsung Chang, *Introduction to Geographical Information System*, Tata McGraw Hill, 4th Edition, 2008.
2. Lo, C.P. and Yeung, Albert K.W., *Concepts and Techniques of Geographic Information Systems,* Prentice Hall, 2nd Edition, 2002.

REFERENCES

1. Michael N. Demers, *Fundamentals of Geographic Information Systems*, John Wiley & sons publishers, 4th Edition, 2009
2. Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasaraju, *An Introduction to Geographical Information Systems*, Pearson Education, 2nd Edition, 2007.
3. John Peter Wilson, *The Handbook of Geographic Information Science*, Blackwell Publishing Ltd, 1st Edition, 2008.

ONLINE LEARNING RESOURCES

1. https:/onlinecourses.nptel.ac.in/noc19_cs76/preview
2. https://archive.nptel.ac.in/courses/105/105/105105202/

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(23CE0157) SOLID WASTE MATERIALS
(Open Elective –IV)

COURSE OBJECTIVES

The objectives of this course is to

1. *To understand the types, sources, and characteristics of solid waste, along with regulatory frameworks.*
2. *To analyze engineering systems for solid waste collection, storage, and transportation.*
3. *To apply resource and energy recovery techniques for sustainable solid waste management.*
4. *To evaluate landfill design, construction, and environmental impact mitigation strategies*
5. *To assess hazardous waste management techniques, including biomedical and e-waste disposal.*

COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

1. *Categorize and can perform sampling of solid waste*
2. *Plan for solid waste management for collection, storage and processing*
3. *Device system for biological conversion of solid waste into useful end products.*
4. *Device system for thermal conversion of solid waste into useful end products.*
5. *Design system for landfilling of solid waste*
6. *Effectively plan for various categories of solid waste such as biomedical waste, E-waste, nuclear waste, industrial waste management*

UNIT -I

Solid Waste:

Definitions - Types of Solid Wastes - Sources of Solid Wastes - Characteristics and Perspectives - Properties of Solid Wastes - Sampling of Solid Wastes - Elements of Solid Waste Management - Integrated Solid Waste Management - Solid Waste Management Rules 2016.

UNIT -II

Engineering Systems for Solid Waste Management:

Solid Waste Generation - On-Site Handling - Storage and Processing - Collection of Solid Wastes - Stationary Container System and Hauled Container Systems - Route Planning - Transfer and Transport - Processing Techniques

UNIT -III

Engineering Systems for Resource and Energy Recovery:

Processing Techniques - Materials Recovery Systems - Recovery of Biological Conversion Products

- Composting - Pre and Post Processing - Types of Composting - Critical Parameters - Problems with Composing - Recovery of Thermal Conversion Products - Pyrolysis - Gasification - RDF - Recovery of Energy From Conversion Products - Materials and Energy Recovery Systems

UNIT -IV

Landfills:

Evolution of Landfills - Types and Construction of Landfills - Design Considerations - Life of Landfills - Landfill Problems - Lining of Landfills - Types of Liners - Leachate Pollution and Control - Monitoring Landfills - Landfills Reclamation

UNIT -V

Hazardous Waste Management:

Sources and Characteristics - Effects on Environment - Risk Assessment - Disposal of Hazardous Wastes - Secured Landfills - Incineration - Monitoring - Biomedical Waste Disposal - E-Waste Management - Nuclear Wastes - Industrial Waste Management

TEXT BOOKS

1. Tchobanoglous G, Theisen H and Vigil SA, *Integrated Solid Waste Management, Engineering Principles and Management Issues,* McGraw-Hill, 1993.
2. Vesilind PA, Worrell W and Reinhart D, *Solid Waste Engineering,* Brooks/Cole Thomson Learning Inc., 2002.

REFERENCES

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, *Environmental Engineering*, McGraw Hill Inc., New York, 1985.
2. Qian X, Koerner RM and Gray DH, *Geotechnical Aspects of Landfill Design and Construction,* Prentice Hall, 2002.

ONLINE LEARNING RESOURCES:

https://archive.nptel.ac.in/courses/105/103/105103205/
https://archive.nptel.ac.in/courses/120/108/120108005

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(23EE0264) ELECTRIC VEHICLES
(Open Elective –IV)

COURSE OBJECTIVES

The course is designed to

1. *Remember and understand the differences between conventional Vehicle and Electric Vehicles, electro mobility and environmental issues of EVs.*
2. *Analyze various EV configurations, parameters of EV systems and Electric vehicle dynamics.*
3. *Analyze the basic construction, operation and characteristics of fuel cells and battery charging techniques in HEV systems.*
4. *Design and analyze the various control structures for Electric vehicle*

COURSE OUTCOMES

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

1. *To understand and differentiate between Conventional Vehicle and Electric Vehicles, electro mobility and environmental issues of EVs.*
2. *Understand Various dynamics of Electric Vehicles*
3. *To remember and understand various configurations in parameters of EV system and dynamic aspects of EV*
4. *To analyze fuel cell technologies in EV and HEV systems*
5. *To analyze the battery charging and controls required of EVs*
6. *Classify different energy management strategies.*

UNIT I

Introduction to EV Systems and Energy Sources:

Past, Present and Future of EV - EV Concept- EV Technology- State-of-the Art of EVs- EV configuration- EV system- Fixed and Variable gearing- Single and multiple motor drive- In-wheel drives- EV parameters: Weight, size, force and energy, performance parameters. Electro mobility and the environment- History of Electric power trains- Carbon emissions from fuels- Green houses and pollutants- Comparison of conventional, battery, hybrid and fuel cell electric systems.

UNIT-II

EV Propulsion andDynamics:

Choice of electric propulsion system- Block diagram- Concept of EV Motors- Single and multi-motor configurations- Fixed and variable geared transmission- In-wheel motor configuration- Classification - Electric motors used in current vehicle applications - Recent EV Motors- Vehicle load factors- Vehicle acceleration

UINIT-III

Fuel Cells:

Introduction of fuel cells- Basic operation- Model - Voltage, power and efficiency- Power plant system,Characteristics- Sizing - Example of fuel cell electric vehicle - Introduction to HEV- Brake specific fuel consumption - Comparison of Series-Parallel hybrid systems- Examples

UNIT-IV

Battery Charging and control:

Battery charging: Basic requirements- Charger architecture- Charger functions- Wireless charging- Power factor correction

Control: Introduction- Modeling of electro mechanical system- Feedback controller design approach- PI controller‘s designing- Torque-loop, Speed control loop compensation- Acceleration of battery electric vehicle

UNIT V

Energy Storage Technologies:

Role of Energy Storage Systems- Thermal- Mechanical-Chemical- Electrochemical- Electrical - Efficiency of energy storage systems- Super capacitors-Superconducting Magnetic Energy Storage (SMES)- SOC- SoH -fuel cells - G2V- V2G- Energy storage in Micro-grid and Smart grid- Energy Management with storage systems- Battery SCADA

TEXT BOOKS:

1. C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University Press Inc., New York 2001,1st Edition
2. Ali Emadi, ―Advanced Electric Drive Vehicles‖, CRC Press, 2017,1st Edition

REFERENCE BOOKS:

1. Electric and Hybrid Vehicles Design Fundamentals, Iqbal Husain, CRC Press 2021, 3rd Edition.
2. Francisco Díaz-González, Andreas Sumper, Oriol Gomis-Bellmunt,‖ Energy Storage in Power Systems‖ Wiley Publication, ISBN: 978-1-118-97130-7, Mar 2016,1st Edition
3. A.G.Ter-Gazarian, ―Energy Storage for Power Systems‖, the Institution of Engineering and Technology (IET) Publication, UK, (ISBN,978-1-84919-219-4), Second Edition, 2011.
4. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, ―Modern Elelctric, Hybrid Elelctric and Fuel Cell Vehicles: Fundamentals, Theory and Design‖, CRC Press, 2004,1st Edition
5. James Larminie, John Lowry, .Electric Vehicle Technology Explained‖, Wiley, 2003,2nd Edition.

Online Learning Resources:

1.https://nptel.ac.in/courses/108/102/108102121/

2.https://nptel.ac.in/syllabus/108103009

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

IV B.Tech - I Sem.

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(23ME0351) TOTAL QUALITY MANAGEMENT
(Open Elective –IV)

COURSE OBJECTIVES

The objectives of the course are

1. *To introduce the fundamental concepts, definitions, and dimensions of quality and Total Quality Management (TQM).*
2. *To explore the evolution of quality management through historical perspectives and contributions of quality gurus.*
3. *To explain the core principles of TQM including customer satisfaction, employee involvement, and continuous improvement.*
4. *To analyze the various TQM tools such as Benchmarking, QFD, FMEA, Six Sigma, and their role in quality enhancement.*
5. *To provide an understanding of quality systems like ISO 9000, ISO 14000, QS 9000, and the processes for their implementation.*

COURSE OUTCOMES

On successful completion of the course, the student will be able to,

1. *Define and explain the basic concepts of quality, quality costs, and the scope of Total Quality Management.*
2. *Summarize the philosophies and contributions of TQM pioneers and evaluate barriers and enablers for TQM implementation.*
3. *Apply TQM principles such as employee empowerment, customer satisfaction, and supplier partnerships to real-world business scenarios.*
4. *Analyze the application of tools like QFD, FMEA, Six Sigma, and Benchmarking in improving product and process quality.*
5. *Evaluate and formulate quality systems like ISO 9000 and ISO 14000, and design documentation and auditing processes.*
6. *Apply the tools and technics of the quality management to manufacturing and service process and to provide quality components at lowest cost*

UNIT -I

Introduction: Definition of Quality, Dimensions of Quality, Definition of Total quality management, Quality Planning, Quality costs,Analysis, Techniques for Quality costs, Basic concepts of Total Quality Management.

UNIT -II

Historical Review: Quality council, Quality statements, Strategic Planning, Deming Philosophy, Barriers of TQM Implementation, Benefits of TQM, Characteristics of successful quality leader,

Contributions of Gurus of TQM, Case studies.

UNIT -III

TQM Principles: Customer Satisfaction,Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement,Motivation, Empowerment teams, Continuous Process Improvement,Juran Trilogy, PDSA Cycle, Kaizen, Supplier Partnership,Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures,Basic Concepts, Strategy, Performance Measure Case studies.

UNIT - IV

TQM Tools: Benchmarking,Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD),House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM),Concept, Improvement Needs, FMEA,Stages of FMEA, The seven tools of quality, Process capability, Concept of Six Sigma, New Seven management tools, Case studies.

UNIT - V

Quality Systems: Need for ISO 9000 and Other Quality Systems, ISO 9000: 2000 Quality System,Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000,Concept, Requirements and Benefits, Case Studies

TEXT BOOKS:

1. Dale H Besterfield, Total Quality Management, Fourth Edition, Pearson Education, 2015.
2. Subburaj Ramaswamy, Total Quality Management, Tata Mcgraw Hill Publishing Company Ltd., 2005.
3. Joel E.Ross , Total Quality Management, Third Eition, CRC Press, 2017.

REFERENCES BOOKS:

1. Narayana V and Sreenivasan N.S, Quality Management,Concepts and Tasks, New Age International, 1996.
2. Robert L.Flood, Beyond TQM, First Edition, John Wiley & Sons Ltd, 1993.
3. Richard S. Leavenworth & Eugene Lodewick Grant, Statistical Quality Control, Seventh Edition, Tata Mcgraw Hill, 2015
4. Samuel Ho, TQM,An Integrated Approach, Kogan Page Ltd, USA, 1995.

ONLINE LEARNING RESOURCES:

https://www.youtube.com/watch?v=VD6tXadibk0
https://www.investopedia.com/terms/t/total-quality-management-tqm.asp
https://blog.capterra.com/what-is-total-quality-management/
https://nptel.ac.in/courses/110/104/110104080/
https://onlinecourses.nptel.ac.in/noc21_mg03/preview
https://nptel.ac.in/courses/110/104/110104085/
https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-mg39/

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(23EC0442) TRANSDUCERS AND SENSORS
(Open Elective –IV)

COURSE OBJECTIVES

The objectives of this course

1. *To understand characteristics of Instrumentation System and the operating principle of motion transducers.*
2. *To explore working principles, and applications of different temperature transducers and Piezo-electric sensors.*
3. *To provide knowledge on flow transducers and their applications.*
4. *To study the working principles of pressure transducers.*
5. *To introduce working principle and applications of force and sound transducers*.

COURSE OUTCOMES

On successful completion of this course, students will be able to

1. *Understand characteristics of Instrumentation System and the operating principle of motion transducers.*
2. *Explore working principles, and applications of different temperature transducers and Piezo-electric sensors.*
3. *Gain knowledge on flow transducers and their applications.*
4. *Learn the working principles of pressure transducers.*
5. *Understand the working principle and applications of force and sound transducers*.
6. *Analyze and select appropriate transducers based on application requirements, standards, calibration methods, and performance characteristics for industrial and biomedical instrumentation systems.*

UNIT-I

Introduction: General Configuration and Functional Description of measuring instruments, Static and Dynamic Characteristics of Instrumentation System, Errors in Instrumentation System, Active and Passive Transducers and their Classification.

Motion Transducers: Resistive strain gauge, LVDT, RVDT, Capacitive transducers, Piezo-electric transducers, seismic displacement pick-ups, vibrometers and accelerometers.

UNIT-II

Temperature Transducers: Standards and calibration, fluid expansion and metal expansion type transducers - bimetallic strip, Thermometer, Thermistor, RTD, Thermocouple and their characteristics. Hall effect transducers, Digital transducers, Proximity devices, Bio-sensors, Smart sensors, Piezo-electric sensors.

UNIT-III

Flow Transducers: Bernoulli‘s principle and continuity, Orifice plate, Nozzle plate, Venture tube, Rotameter, Anemometers, Electromagnetic flow meter, Impeller meter and Turbid flow meter.

UNIT-IV

Pressure Transducers: Standards and calibration, different types of manometers, elastic transducers, diaphragm bellows, bourdon tube, capacitive and resistive pressure transducers, high and low pressure measurement.

UNIT-V

Force and Sound Transducers: Proving ring, hydraulic and pneumatic load cell, dynamometer and gyroscopes. Sound level meter, sound characteristics, Microphone.

TEXT BOOKS:

1. A. K. Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation*, 3rd Edition, Dhanpat Rai & Co., Delhi, 2010.
2. C. S. Rangan, G. R. Sarma, V. S. V. Mani, *Instrumentation Devices and Systems*, Tata McGraw Hill Publications, 2007.

REFERENCES BOOKS:

1. E. O. Doebelin, *Measurement Systems: Application and Design*, McGraw Hill International, New York, 2004.
2. B. C. Nakra, K. K. Chaudhary, *Instrumentation Measurement and Analysis*, 2nd Edition, Tata McGraw-Hill Publication Ltd., 2006.

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IV B.Tech - I Sem.

L	T	P	C
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(23HS0857) FINANCIAL MATHEMATICS
(Open Elective–IV)
(Common to All Branches)

COURSE OBJECTIVES

The course is designed to

1. *To provide mathematical foundations for financial modelling, risk assessment and asset pricing.*
2. *To introduce stochastic models and their applications in pricing derivatives and interest rate modelling.*
3. *To develop analytical skills for fixed-income securities, credit risk, and investment strategies.*
4. *To equip students with computational techniques for pricing financial derivatives.*

COURSE OUTCOMES

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

1. *Explain fundamental financial concepts, including arbitrage, valuation, and risk.*
2. *Apply stochastic models, including Brownian motion and Stochastic Differential Equations (SDEs), in financial contexts.*
3. *Analyze mathematical techniques for pricing options and financial derivatives.*
4. *Apply model credit risk concept in various contexts, such as loan portfolios*
5. *Evaluate interest rate models and bond pricing methodologies.*
6. *Utilize computational techniques such as Monte Carlo simulations for financial modeling.*

UNIT-I

Asset Pricing and Risk Management

Fundamental financial concepts: Returns, arbitrage, valuation, and pricing. Asset/Liability management, investment income, capital budgeting, and contingent cash flows. One-period model: Securities, payoffs, and the no-arbitrage principle. Option contracts: Speculation and hedging strategies, CAP Model, Efficient market hypothesis.

UNIT-II

Stochastic Models in Finance

Random Walks and Brownian Motion. Introduction to Stochastic Differential Equations (SDEs): Drift and diffusion. Ito calculus: Ito‘s Lemma, Ito Integral, and Ito Isometry.

UNIT-III

Interest Rate and Credit Modelling

Interest rate models and bond markets. Short-rate models: Vasicek, Cox-Ingersoll-Ross (CIR), Hull & White models, Credit risk modelling: Hazard function and hazard rate.

UNIT-IV

Fixed-Income Securities and Bond Pricing

Characteristics of fixed-income products: Yield, duration, and convexity. Yield curves, forward rates, and zero-coupon bonds. Stochastic interest rate models and bond pricing PDE. Yield curve fitting and calibration techniques, Mortgage Backed Securities.

UNIT-V

Exotic Options and Computational Finance

Stochastic volatility models and the Feynman-Kac theorem.Exotic options: Barriers, Asians, and Look backs. Monte Carlo methods for derivative pricing, Black-Scholes-Merton model: Derivation and applications.

TEXT BOOKS:

1. Ales Cerny, *Mathematical Techniques in Finance: Tools for Incomplete Markets*, Princeton University Press.
2. S.R. Pliska, *Introduction to Mathematical Finance: Discrete-Time Models*, Cambridge University Press.

REFERENCE BOOKS:

1. IoannisKaratzas& Steven E. Shreve, *Methods of Mathematical Finance*, Springer, New York.
2. John C. Hull, *Options, Futures, and Other Derivatives*, Pearson.

WEB REFERENCES BOOKS:

1. MIT– Mathematics for Machine Learning https://ocw.mit.edu
2. Coursera,Financial Engineering and Risk Management (Columbia University) https://www.coursera.org/
3. National Stock Exchange (NSE) India,Financial Derivatives https://www.nseindia.com/

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IV B.Tech - I Sem.

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(23HS0845) SENSORS AND ACTUATORS FOR ENGINEERING APPLICATIONS
(Open Elective–IV)
(Common to all branches of Engineering)

COURSE OBJECTIVES

The course is designed to

1. *To provide exposure to various kinds of sensors and actuators and their engineering applications.*
2. *To impart knowledge on the basic laws and phenomenon behind the working of sensors and actuators*
3. *To explain the operating principles of various sensors and actuators*
4. *To educate the fabrication of sensors*
5. *To explain the required sensor and actuator for interdisciplinary application.*

COURSE OUTCOMES

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

1. *Classify different types of Sensors and Actuators along withtheir characteristics .*
2. *Summarize various types of Temperature and Mechanical sensors.*
3. *Illustrates various types of optical and mechanical sensors*
4. *Analyze various types of Optical and Acoustic Sensors*
5. *Interpret the importance of smart materials in various devices*

UNIT- I

Introduction to Sensors and Actuators

Sensors: Types of sensors: temperature, pressure, strain, active and passive sensors, General characteristics of sensors (Principles only).

Actuators: Functional diagram of actuators, Types of actuators and their basic principle of working: Pneumatic, Electromagnetic, Piezo-electric and Piezo-resistive actuators, Applications of Actuators.

UNIT-II

Temperature and Mechanical Sensors

Temperature Sensors: Types of temperature sensors and their basic principle of working: Thermo- resistive sensors: Thermistors, Thermo-electric sensors: Thermocouples, PN junction temperature sensors

Mechanical Sensors: Types of Mechanical sensors and their basic principle of working: Force sensors: Strain gauges, Tactile sensors, Pressure sensors: Piezoresistive, Variable Reluctance Sensor (VRP).

UNIT-III

Optical and Acoustic Sensors

Optical Sensors: Basic principle and working of: Photodiodes, Phototransistors and Photo resistors based sensors, Photomultipliers, Infrared sensors: thermal, Passive Infra-Red, Fiber based sensors and Thermopiles

Acoustic Sensors: Principle and working of Ultrasonic sensors, Piezo-electric resonators, Microphones

UNIT-IV

Magnetic and Electromagnetic Sensors

Motors as actuators (linear, rotational, stepping motors), magnetic valves, inductive sensors (LVDT, RVDT, and Proximity), Hall Effect sensors, Magneto-resistive sensors, Magnetostrictive sensors and actuators.

UNIT-V

Chemical and Radiation Sensors

Chemical Sensors: Principle and working of Electro-chemical, Thermo-chemical, Gas, pH, Humidity and moisture sensors.

Radiation Sensors: Principle and working of Ionization detectors, Scintillation detectors, Semiconductor radiation detectors and Microwave sensors (resonant, reflection, transmission)

TEXT BOOKS:

1. Sensors and Actuators,Clarence W. de Silva, CRC Press, 2nd Edition, 2015
2. Sensors and Actuators, D.A.Hall and C.E.Millar, CRC Press, 1999

REFERENCE BOOKS:

1. Sensors and Transducers- D.Patranabhis, Prentice Hall of India (Pvt) Ltd. 2003
2. Measurement, Instrumentation, and Sensors Handbook-John G.Webster, CRC press 1999
3. Sensors,A Comprehensive Sensors- Henry Bolte, John Wiley.
4. Handbook of modern sensors, Springer, Stefan Johann Rupitsch.

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IV B.Tech - I Sem.

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(23HS0809) CHEMISTRY OF NANOMATERIALS AND APPLICATIONS
(Open Elective–IV)

COURSE OBJECTIVES

The objectives of this course:

1. *To understand basics and characterization of nanomaterials.*
2. *To understand synthetic methods of nanomaterials.*
3. *To apply various techniques for characterization of nanomaterials.*
4. *To understand Studies of Nano-structured Materials.*
5. *To enumerate the applications of advanced nanomaterials in engineering.*

COURSE OUTCOMES

By the end of the program students will be able to

1. *Understand the basic concepts and classification of nanomaterials.*
2. *Analyze the synthesis of a nanomaterial's using various methods comparing and evaluating their effectiveness.*
3. *Apply various instrumental methods to cauterize nanomaterials and interpret the result.*
4. *Apply the BET method for surface area and porosity analysis of nanomaterials and porous solids.*
5. *Apply knowledge of synthesis, properties and applications of various nanomaterials..*
6. *Evaluate the applications of nanomaterials in various fields and their benefits in day to day Life.*

UNIT –I
BASICS AND CHARACTERIZATION OF NANOMATERIALS

Introduction**,** Scope of nanoscience and nanotechnology, nanoscience in nature, classification of nanostructured materials, importance of nanomaterials.

UNIT –II
SYNTHESIS OF NANOMATERIALS

Top-Down approach**,** Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling method.

Synthetic Methods**:** Bottom-Up approach**,** Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

UNIT-III

TECHNIQUES FOR CHARACTERIZATION

Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterials, BET method for surface area analysis, dynamic light scattering for particle size determination.

UNIT-IV

STUDIES OF NANO-STRUCTURED MATERIALS

Synthesis, properties and applications of the following nanomaterials -fullerenes, carbon nanotubes, 2D-nanomaterial (Graphene), core-shell, magnetic nanoparticles, thermoelectric materials, non-linear optical materials.

UNIT-V

ADVANCED ENGINEERING APPLICATIONS OF NANOMATERIALS

Applications of Nano Particle: Nanorods and Nano wires in Water treatment, sensors, electronic devices, medical domain.Applications of Nano Particle in Civil engineering-Enhancing concrete properties, chemical engineering-Drug delivery, metallurgy and mechanical engineering-Enhanced material properties, food science, agriculture, pollutants degradation.

TEXT BOOKS:

1. NANO: The Essentials: T Pradeep, MaGraw-Hill, 2007.
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, BaldevRai, BB Rath and James Murday, Univ. Press, 2012.

REFERENCE BOOKS:

1. Concepts of Nano chemistry; Ludovico Cademrtiri and Geoffrey A. Ozin & Geoffrey A. Ozin, Wiley-VCH, 2011.
2. Nanostructures &Nanomaterials; Synthesis, Properties & Applications: Guozhong Cao, Imperial College Press, 2007.

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IV B.Tech – I Sem.

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(23HS0825) LITERARY VIBES
(Open Elective–IV)
(Common to all branches)

COURSE OBJECTIVES

The course is designed to

1. *To inculcate passion for aesthetic sense and reading skills.*
2. *To encourage respecting others' experiences and creative writing.*
3. *To explore emotions, communication skills and critical thinking.*
4. *To educate how books serve as the reflection of history and society.*
5. *To provide practical wisdom and duty of responding to events of the times.*

COURSE OUTCOMES

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

1. *Identify genres, literary techniques and creative uses of language in literary texts.*
2. *Explain the relevance of themes found in literary texts to contemporary Personal and cultural values and to historical forces.*
3. *Apply knowledge and understanding of literary texts when responding to others' problems and their own and make evidence-based arguments*
4. *Analyze the underlying meanings of the text by using the elements of literary texts.*
5. *Evaluate their own work and that of others critically*
6. *Develop as creative, effective, independent and reflective students who are able to make informed choices in process and performance*

UNIT I

Poetry

1. Ulysses - Alfred Lord Tennyson
2. A in't I woman?-Sojourner Truth
3. The Second Coming-W.B. Yeats
4. Where the Mind is Without Fear-Rabindranath Tagore

UNIT II

Drama:

Twelfth Night-William Shakespeare

1. Shakespeare- life and works
2. Plot & sub- plot and Historical background of the play
3. Themes and Criticism
4. Style and literary elements
5. Characters and characterization

UNIT III

Short Story

1. The Luncheon –Somerset Maugham
2. The Happy Prince- Oscar Wild
3. Three Questions,Leo Tolstoy
4. Grief–Antony Chekov

UNIT IV

Prose: Essay and Auto-biography

1. My struggle for an Education-Booker T Washington
2. The Essentials of Education-Richard Livingston
3. The story of My Life-Helen Keller
4. Student Mobs-J B Priestly
5. My Days: A Memoir

UNIT V

Novel: Hard Times-Charles Dickens

1. Charles Dickens-Life and works
2. Plot and Historical back ground of the novel
3. Themes and criticism
4. Style and literary elements
5. Characters and characterization

TEXT BOOKS:

1. Charles Dickens**.** HardTimes. (Sangam A bridged Texts) Vantage Press,1983
2. DENTJC. William Shakespeare. Twelfth Night**.** Oxford University Press,2016.

REFERENCE BOOKS:

1. WJ Long.History of English Literature, Rupa Publications India; First Edition (4October 2015)
2. R K Kaushik and SC Bhatia. Essays, Short Stories and One Act Plays, Oxford University Press .2018.
3. Dhanvel, S P. English and Soft Skills, Orient Blackswan, 2017.
4. New Horizon, Pearson publications, New Delhi 2014
5. Vimala Ramarao, Explorations Volume-II, Prasaranga Bangalore University,2014**.**
6. DevNeira, Anjana & Co. Creative Writing: A Beginner's Manual. Pearson India, 2008.
7. Narayan, R. K. (1974). My days: A memoir. New Delhi: Indian Thought Publications.

ONLINE LEARNING RESOURCES:

1. https://www.litcharts.com/poetry/alfred-lord-tennyson/ulysses
2. https://www.litcharts.com/lit/ain-t-i-a-woman/summary-and-analysis
3. https://englishliterature.education/articles/poetry-analysis/the-second-coming-by-w-b-yeats-critical-analysis-summary-and-line-by-line-explanation/#google_vignette

4. https://sirjitutorials.com/where-the-mind-is-without-fear-poem-notes-explanation/https://www.litcharts.com/lit/twelfth-night/themes
5. https://smartenglishnotes.com/2021/11/28/the-luncheon-summary-characters-themes-and-irony/

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(23CS0552) SKILL ENHANCEMENT COURSE: PROMPT ENGINEERING

COURSE OBJECTIVE

This course delves into prompt engineering principles, strategies, and best practices, a crucial aspect in shaping AI models' behaviour and performance. Understanding Prompt Engineering is a comprehensive course designed to equip learners with the knowledge and skills to effectively generate and utilize prompts in natural language processing (NLP) and machine learning (ML) applications. This course delves into prompt engineering principles, strategies, and best practices, a crucial aspect in shaping AI models' behaviour and performance.

COURSE OUT COMES

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

1. *Under standing the fundamentals and evolution of prompt engineering.*
2. *Gaining the ability to craft effective closed-ended, open-ended, and role-based prompts.*
3. *Learning to probe and stress-test AI models for bias and robustness.*
4. *Applying prompt optimization techniques and performance evaluation methods.*
5. *Mitigating bias and promoting ethical prompting practices in NLP/ML systems.*
6. *Demonstrate ethical considerations, limitations, and responsible use of AI while engineering prompts.*

Module 1: Introduction to Prompt Engineering

Lesson 1: Foundations of Prompt Engineering

1. Overview of prompt engineering and its significance in NLP and ML.
2. Historical context and evolution of prompt-based approaches.

Module 2: Types of Prompts and Their Applications

Lesson 2: Closed-Ended Prompts

1. Understanding and creating prompts for specific answers.
2. Applications in question- answering systems.

Lesson 3: Open-Ended Prompts

1. Crafting prompts for creative responses.
2. Applications in language generation models.

Module 3: Strategies for Effective Prompting

Lesson 4: Probing Prompts

1. Designing prompts to reveal model biases.

2. Ethical considerations in using probing prompts.

Lesson 5: Adversarial Prompts

1. Creating prompts to stress-test models.
2. Enhancing robustness through adversarial prompting.

Module 4: Fine-Tuning and Optimizing with Prompts

Lesson 6: Fine-Tuning Models with Prompts

1. Techniques for incorporating prompts during model training.
2. Balancing prompt influence and generalization.

Lesson 7: Optimizing Prompt Selection

1. Methods for selecting optimal prompts for specific tasks.
2. Customizing prompts based on model behavior.

Module 5: Evaluation and Bias Mitigation

Lesson 8: Evaluating Prompt Performance

1. Metrics and methodologies for assessing model performance with prompts.
2. Interpreting and analyzing results.

Lesson 9: Bias Mitigation in Prompt Engineering

1. Strategies to identify and address biases introduced by prompts.
2. Ensuring fairness and inclusivity in prompt-based models.

Module 6: Real-World Applications and Case Studies

Lesson 10: Case Studies in Prompt Engineering

1. *Exploration of successful implementations and challenges in real-world scenarios.*
2. *Guest lectures from industry experts sharing their experiences.*

TEXT BOOKS:

1. "Prompt Engineering in Action",*Danny D. Sullivan*
2. "The Art of Prompt Engineering with Chat GPT: A Hands-On Guide",*Nathan Hunter.*

REFERENCE BOOKS:

1. "Prompt Engineering in Practice",*Michael F. Lewis*
2. "Mastering AI Prompt Engineering: The Ultimate Guide for Chat GPT Users", *Adriano Damiao*
3. "Writing AI Prompts For Dummies",*Stephanie Diamond and Jeffrey Allan*
4. "Prompt Engineering Guide" (Online Resource),*promptingguide.ai*

ONLINE RESOURCE LINK :

https://www.udemy.com/course/understanding-prompt-engineering/?couponCode=NVDINCTA35TRT

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(23HS0820) GENDER SENSITIZATION
(Common to All Branches of Engineering)

COURSE OBJECIVES

The course is designed to

1. *To enable students to understand the gender related issues, vulnerability of women and men*
2. *To familiarize them about constitutional safeguard for gender equality*
3. *To expose the students to debates on the politics and economics of work*
4. *To help students reflect critically on gender violence*
5. *To make them understand that gender identities and gender relations are part of culture as they shape the way daily life is lived in the family as well as wider community and the workplace.*

COURSE OUCOMES

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

1. *Understand the basic concepts of gender and its related terminology*
2. *Identify the biological, sociological, psychological and legal aspects of gender.*
3. *Use the knowledge in understanding how gender discrimination works in our society and how to counter it.*
4. *Analyzethe gendered division of labour and its relation to politics and economics.*
5. *Appraise how gender-role beliefs and sharing behaviour are associated with more well-being in all culture and gender groups*
6. *Develop students' sensibility with regard to issues of gender in contemporary India*

UNIT-1

UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT-2

GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and its Consequences- Declining Sex Ratio- Demographic Consequences-Gender Spectrum -

UNIT-3

GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- ―My Mother doesn‘t Work.‖ ―Share the Load.‖-Work: Its Politics and Economics -Fact and Fiction- Unrecognized and Unaccounted work -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

UNIT-4

GENDER-BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment - Domestic Violence - Different forms of violence against women - Causes of violence, impact of violence against women - Consequences of gender-based violence

UNIT-5

GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language- Just Relationships

TEXT BOOKS

1. A.Suneetha, Uma Bhrugubanda, et al. Towards a World of Equals: A Bilingual Textbook on Gender‖, Telugu Akademi, Telangana, 2015.
2. Butler, Judith. Gender Trouble: Feminism and the Subversion of Identity. UK Paperback Edn. March 1990

REFERENCE BOOKS

1. Wtatt, Robin and Massood, Nazia, Broken Mirrors: The dowry Problems in India,London : Sage Publications, 2011
2. Datt, R. and Kornberg, J.(eds), Women in Developing Countries, Assessing Strategies for Empowerment, London: Lynne Rienner Publishers, 2002
3. Brush, Lisa D., Gender and Governance, New Delhi, Rawat Publication, 2007
4. Singh, Direeti, Women and Politics World Wide, New Delhi, Axis Publications, 2010
5. Raj Pal Singh, Anupama Sihag, Gender Sensitization: Issues and Challenges (English, Hardcover), Raj Publications, 2019
6. A.Revathy& Murali, Nandini, A Life in Trans Activism(Lakshmi Narayan Tripathi). The University of Chicago Press, 2016

ONLINE RESOURCES

1. **Understanding Gender:**
   Chrome- extension://kdpelmjpfafjppnhbloffcjpeomlnpah
   https://www.arvindguptatoys.com/arvindgupta/k amla-gender1.pdf
   https://onlinecourses.swayam2.ac.in/nou24_hs53/preview

2. **Gender Roles And Relations:**
   https://www.plannedparenthood.org/learn/gender-identity/sex-gender-identity/what-are-gender-roles-and-stereotypes
   https://www.verywellmind.com/understanding-gender-roles-and-their-effect-on-our-relationships-7499408
   https://onlinecourses.swayam2.ac.in/cec23_hs29/preview
3. **Gender And Labour:**
   https://www.economicsobservatory.com/what-explains-the-gender-division-of-labour-and-how-can-it-be-redressed
   https://onlinecourses.nptel.ac.in/noc23_mg67/preview

4. **Gender-Based Violence:**
   https://eige.europa.eu/gender-based-violence/what-is-gender-based-violence?language_content_entity=en
   https://www.worldbank.org/en/topic/socialsustainability/brief/violence-against-women-and-girls
   https://onlinecourses.swayam2.ac.in/nou25_ge38/preview
5. **Gender and culture**
   https://gender.study/psychology-of-gender/culture-impact-gender-roles-identities/https://sociology.iresearchnet.com/sociology-of-culture/gender-and-culture/https://archive.nptel.ac.in/courses/109/106/109106136/
   Abdulali Sohaila.―I Fought For My Life…and Won.‖ Available online (at:http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/)

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(23CI0612) PROJECT WORK

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