Department of Electrical and Electronics Engineering

B.Tech EEE R23 Regulations

IV B.Tech, I Semester – EEE (R23 Regulations)

S.No.	Course Code	Title	L	T	P	C
1.	23EET20	Power System Operation and Control	3	0	0	3
		Management Course – II:	2	0	0	2
2.	23MBTU4a	Business Ethics and Corporate Governance				
3.	23MBTU4b	E-Business				
4.	23MBTU4c	Management Science				
		Professional Elective – IV:	3	0	0	3
5.	23ECT18	Digital Signal Processing				
6.	23EET21a	Electric Vehicle Technology				
7.	23EET21b	HVDC & FACTS				
		Professional Elective – V:	3	0	0	3
8.	23EET22a	Modern Control Theory				
9.	23EET22b	Switched Mode Power Conversion				
10.	23EET22c	Electrical Distribution System				
11.	—	**Open Elective – III**	3	0	0	3
12.	—	**Open Elective – IV**	3	0	0	3
13.	23EEP11	**Skill Enhancement Course**: Power Systems and Simulation Lab	0	0	4	2
14.	23BST29	**Audit Course**: Gender Sensitization	2	0	0	–
15.	23EEP13	**Internship**: Evaluation of Industry Internship	–	–	–	2
Total			**19**	**0**	**4**	**21**

Open Elective – III

.No	Course Code	Course Name	Offered by the Dept.
1	23CET24	Building Materials and Services	CIVIL
2	23CET25	Environmental Impact Assessment	
3	23MET23	3D Printing Technologies	ME
4	23ECT12	Microprocessors and Microcontrollers	ECE
5	23CST32	Data Base Management Systems	CSE & Allied/IT
6	23CST18b	Cyber Security	
7	23BST30	Wavelet Transforms and its Applications	Mathematics
8	23BST31	Smart Materials and Devices	Physics
9	23BST34	Introduction to Quantum Mechanics	
10	23BST32	Green Chemistry and Catalysis for Sustainable Environment	Chemistry
11	23BST33	Employability Skills	Humanities

Open Elective – IV

S.No	Course Code	Course Name	Offered by the Dept.
1	23CET26	Geo-Spatial Technologies	CIVIL
2	23CET27	Solid Waste Management	
3	23MET24	Total Quality Management	ME
4	23ECT29	Transducers and Sensors	ECE
5	23CST33	Introduction to Computer Networks	CSE & Allied/IT
6	23CST23d	Internet of Things	

7	23CST34	Introduction to Quantum Computing	
8	23BST35	Financial Mathematics	Mathematics
9	23BST36	Sensors and Actuators for Engineering Applications	Physics
10	23BST37	Chemistry of Nanomaterials and Applications	Chemistry
11	23BST38	Literary Vibes	Humanities

IV B.Tech II Semester (EEE) – R23 Regulations

S.No.	Course Code	Title	Category	L	T	P	Credits
1	23EEP14	Internship	–	–	–	–	4
2		Project	–	–	–	–	8
Total							**12**

IV Year B.Tech. EEE – I Semester

23EET20	**POWER SYSTEM OPERATION AND CONTROL (Professional Core)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives: The objectives of the course are to make the students learn about:

- Optimal Operation of Thermal Power Stations.
- Hydrothermal Scheduling.
- Modelling of Turbines and Generators.
- Load frequency control of Single Area and Two Area Systems.
- The Shunt and Series Reactive Power Compensations in Power Systems.
- The Key Aspects of Power System Deregulation.

Course Outcomes:

CO1: To Understand the Thermal Station Characteristics and Economic Dispatch Problem of Thermal Units and Understand the Optimal Scheduling of Hydro-Thermal Station with minimization of cost of Thermal station– **L3.**

CO2: To Develop the First Order Models of Turbine, Governor and Generator Load Model – **L4.**

CO3: To Evaluate the Steady State & Dynamic Analysis of Single Area and Two Area Load Frequency Control **– L3.**

CO4: To Analyse the Series & Shunt Reactive Power Compensation in Transmission and Load Systems **– L3.**

CO5: To Understand the Aspects of Power System Deregulation – **L2.**

UNIT I

Optimum Operation Thermal Power Station:

Optimum Operation of Thermal Power Station: Heat Rate Curve – Cost Curve – Incremental Fuel Rate – Incremental Fuel Cost and Production Cost, Input – Output Characteristics of Thermal Power Stations and Hydro Power Stations. Optimum Generation Allocation of Thermal Units without Transmission Line Losses and Optimum Generation Allocation with effect of Transmission Line Losses. Transmission Line Loss Formula, Loss coefficients, Numerical Problems.

UNIT II

Economic Operation of Hydro – Thermal Scheduling:

Optimum Operation of Hydrothermal Power Stations:

Hydrothermal Coordination Methods – Optimal power flow problem formulation for loss and cost minimization, Solution of optimal power flow problem using Newton‘s method and Linear Programming technique – Numerical problems.

UNIT III

Load Frequency Control:

Modelling of Turbine & Governor:

The first order Turbine model, Block Diagram representation of Steam Turbines and approximate Linear models, Mathematical Modelling of Speed Governing Systems – Derivation of small Signal Transfer function – Block Diagram.

Single Area Load Frequency Control:
Necessity of Keeping Frequency constant, Definition of Control Area – Single Area Control – Block Diagram representation of an Isolated Power System – Steady State Analysis – Dynamic Response – Controlled & Uncontrolled case.

Two Area Load Frequency Control:
Load Frequency control of Two Area system – Controlled and Uncontrolled case, Tie – Line Bias Control. Proportional Plus Integral Control of Single Area and Its Block Diagram Representation, Steady State Response – Load Frequency Control and Economic Dispatch Control.

UNIT IV

Reactive Power Control:
Overview of Reactive Power Control – Reactive Power Compensation in Transmission Systems – Advantages and Disadvantages of Different Types of Compensating Equipment for Transmission Systems; Load Compensation – Specifications of Load Compensator, Uncompensated and Compensated Transmission Lines: Shunt and Series Compensation.

UNIT V

Power System Deregulation:
Principle of economics, utility functions, power exchanges, electricity market models, market power indices, ancillary services, transmission and distribution charges, principles of transmission charges, transmission pricing methods, demand-side management, regulatory framework – Numerical problems.

Textbooks:

1. Modern Power System Analysis, D.P.Kothari and I.J.Nagrath, Tata McGraw Hill Publishing Company Ltd.,
2. Electric Energy Systems Theory: An Introduction, Olle I. Elgerd, TMH Publishing Company Ltd., New Delhi, 2nd edition, 1983.

References:

1. Power Generation, Operation and Control, Allen J. Wood and Bruce F. Wollenberg, John Wiley & Sons, Inc., New York, 2nd edition, 1996.
2. Reactive Power Control in Electric Systems, T J E Miller, John Wiley & Sons, New York, 1982.
3. Power System Analysis Operation and Control, Abhijit Chakrabarti and Sunita Halder, PHI Learning Pvt. Ltd.,, 3rd Edition, 2010.

Online Learning Resources:

1. https://archive.nptel.ac.in/courses/108/104/108104052/
2. http://kcl.digimat.in/nptel/courses/video/108104191/L01.html
3. https://nptel.ac.in/courses/108101040

Course Code	BUSINESS ETHICS AND CORPORATE GOVERNANCE	L	T	P	C
23MBTU4a		2	0	0	2
	Semester		IV-I		

Course Objectives:

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 (CO): Student will be able to

- Understand the Ethics and different types of Ethics.
- Understand business ethics and ethical practices in management
- Understand the role of ethics in management
- Apply the knowledge of professional ethics & technical ethics
- Analyze corporate law, ethics, codes & principles
- Evaluate corporate governance & corporate scams.

UNIT-I Lecture Hrs: 7

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 Lecture Hrs: 7

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 Lecture Hrs: 7

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 Lecture Hrs: 7

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 Lecture Hrs: 7

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.

Textbooks:

1. Murthy CSV: Business Ethics and Corporate Governance, HPH July 2017
2. Bholananth Dutta, S.K. Podder – Corporation Governance, VBH. June 2010

Reference Books:

1. Dr. K. Nirmala, KarunakaraReaddy. Business Ethics and Corporate Governance, HPH
2. H.R.Machiraju: Corporate Governance, HPH, 2013
3. K. Venkataramana, Corporate Governance, SHBP.
4. N.M.Khandelwal. Indian Ethos and Values for Managers

Course Code	E-BUSINESS	L	T	P	C
23MBTU4b		2	0	0	2
Semester		IV-I			

Course Objectives:

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 (CO): Student will be able to

- Remember E-Business & its nature, scope and functions.
- Understand E-market-Models which are practicing by the organizations
- Apply the concepts of E-Commerce in the present globalized world.
- Analyze the various E-payment systems & importance of net banking.
- Evaluate market research strategies & E-advertisements.
- Understand importance of E-security & control.

UNIT-I — Lecture Hrs: 7

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 — Lecture Hrs: 7

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)-AuctionsB2B Portals in India

UNIT-III — Lecture Hrs: 7

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 — Lecture Hrs: 7

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 ebusiness platforms.

UNIT-V — Lecture Hrs: 7

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)

Textbooks:

1. Arati Oturkar & Sunil Khilari. E-Business. Everest Publishing House, 2022
2. P.T.S Joseph. E-Commerce, Fourth Edition, Prentice Hall of India, 2011

Reference Books:

Reference Books:

1. Debjani, Kamalesh K Bajaj. E-Commerce, Second Edition Tata McGraw-Hill‘s, 2005
2. Dave Chaffey.E-Commerce E-Management, Second Edition, Pearson, 2012.
3. Henry Chan. E-Commerce Fundamentals and Application, RaymondLeathamWiley India 2007
4. S. Jaiswal. E-Commerce GalgotiaPublication Pvt Ltd., 2003.

Course Code	MANAGEMENT SCIENCE	L	T	P	C
23MBTU4c		2	0	0	2
Semester		IV-I			

Course Objectives:

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 (CO): Student will be able to

- Remember the concepts & principles of management and designs of organization in a practical world
- Understand the knowledge of Work-study principles & Quality Control techniques in industry
- Apply the process of Recruitment & Selection in organization.
- Analyze the concepts of HRM & different training methods.
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.
- Create awareness on contemporary issues in modern management & technology.

UNIT-I

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

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

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

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

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.

Textbooks:

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.
2. Koontz & Weihrich, Essentials of Management, 6/e, 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, 9/e, PHI, 2005

23ECT18	**DIGITAL SIGNAL PROCESSING**	**L**	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. To get familiar with the properties of discrete time signals, systems and z-transform.
2. To learn the importance of FFT algorithm for computation of Discrete Fourier Transform and Fast Fourier Transform with decimations.
3. To understand the implementations of digital filter structures.
4. To analyse the FIR filter design using Fourier series and windowing methods.
5. To gain the knowledge on Programmable DSP Devices.

Course Outcomes:

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

1. Familiar with the properties of discrete time signals, systems and z-transform.
2. Learn the importance of FFT algorithm for computation of Discrete Fourier Transform and Fast Fourier Transform with decimations.
3. Understand the implementations of digital filter structures.
4. Analyse the FIR filter design using Fourier series and windowing methods.
5. Gain the knowledge on Programmable DSP Devices.

UNIT I

Introduction to discrete time signals and systems: Introduction to digital signal processing,

Review of discrete-time signals and systems, Analysis of discrete-time linear time invariant systems, frequency domain representation of discrete time signals and systems

Z–Transform: Definition, ROC, Properties, Poles and Zeros in Z-plane, the inverse Z-Transform, System analysis, Transfer function, BIBO stability, System Response to standard signals, Solution of difference equations with initial conditions, Illustrative Problems, analysis of linear time-invariant systems in the z-domain, pole-zero stability.

UNIT II

Discrete Fourier Transform : Introduction, Discrete Fourier Series, properties of DFS, Discrete Fourier Transform, Inverse DFT, properties of DFT, Linear and Circular convolution, convolution using DFT, sampling, Quantization effects.

Fast Fourier Transform: Introduction, Fast Fourier Transform, Radix-2 Decimation in time and Decimation in frequency FFT, Inverse FFT (Radix-2).

UNIT III

IIR Filters: Introduction to digital filters, Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from analog filters by Impulse invariant and bilinear transformation methods, Frequency transformations, Basic structures of IIR Filters - Direct form-I, Direct form-II, Cascade form and Parallel form realizations.

UNIT IV

FIR Filters: Introduction, Characteristics of FIR filters with linear phase, Frequency response of linear phase FIR filters, Design of FIR filters using Fourier series and windowing methods (Rectangular, Triangular, Raised Cosine, Hanging, Hamming, Blackman), Comparison of IIR & FIR filters, Basic structures of FIR Filters – Direct form, Cascade form, Linear phase realizations.

UNIT V

Architectures for Programmable DSP Devices: Architecture of TMS320C5X: Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Register ALU, Index Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, some flags in the status registers, On- chip memory, On-chip peripherals.

Textbooks:

1. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing, Principles, Algorithms, and Applications, Pearson Education, 2007.
2. A.V.Oppenheim and R.W. Schaffer, Discrete Time Signal Processing ,PHI.

References:

1. S.K.Mitra, Digital Signal Processing – A practical approach , 2nd Edition, Pearson Education, New Delhi, 2004.
2. MH Hayes, Digital Signal Processing, Schaum’s Outline series, TATA Mc-Graw Hill, 2007.
3. Robert J. Schilling, Sandra L. Harris, Fundamentals of Digital Signal Processing using Matlab, Thomson, 2007.

IV Year B.Tech. EEE – I Semester

23EET21a	**ELECTRIC VEHICLE TECHNOLOGY (Professional Elective - IV)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives (COs) – Electric Vehicles

After successful completion of this course, the student will be able to:

1. **Understand the fundamentals of Electric Vehicles (EVs)**, their evolution, environmental benefits, and comparison with conventional and hybrid vehicles.
2. **Explain the configuration and operation of electric drive-train topologies** and power flow control in electric traction systems.
3. **Analyze the working and control of electric motor drives** such as BLDC, Induction Motor, Permanent Magnet Motor, and Switched Reluctance Motor used in EVs.
4. **Evaluate various energy storage technologies** including batteries, supercapacitors, fuel cells, and their hybridization for electric vehicle applications.
5. **Assess energy management strategies and EV charging infrastructure**, including charging standards, communication protocols, battery thermal protection, and current challenges in electric vehicles.

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

CO1: Illustrate electric vehicles**. (L2)**
CO2: Understand drive-train topologies**. (L2)**
CO3: Classify various electrical drives **(L2)**
CO4: Classify energy storage technologies. **(L2)**
CO5: Classify different energy management strategies**. (L2)**

UNIT-I:
Introduction To Electric Vehicles:
History of electric vehicles, social and environmental importance of electric vehicles, impact of modern drive-trains on energy supplies.

CASE STUDY
Comparison by efficiency of Conventional, Hybrid, Electric and Fuel cell Vehicles.

UNIT-II:
Electric Drive-Trains:
Basic concept of electric traction, Introduction to various electric drive-train topologies, Power flow control in electric drive-train topologies.

UNIT-III
Electric Drives & Control:
Introduction to electric components used in electric vehicles, Control of BLDC Motor, Control of Induction Motor Drive, Permanent Magnet (PM) motor Drive & Switched Reluctance Motor (SRM) Drive.

UNIT-IV:
Energy Storage:
Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its modeling, SOC, Different Types of Batteries, Super Capacitor based energy storage and its analysis, Fuel Cells, Hybridization of different energy storage devices.

UNIT-V:

Energy Management Strategies & Charging Infrastructure:

Introduction to energy management strategies used in electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies, Types of EV charging Infrastructure & Standardized Communication protocols for EV charging.

CASE STUDIES

Current issues in electric Vehicles, Thermal Protection of Battery.

TEXT BOOKS:

1. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, —Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design‖, CRC Press, 2 nd Edition, 2017. (Unit-I, II)
2. Ali Emadi, —Advanced Electric Drive Vehicles (Energy, Power Electronics, and Machines)‖, CRC Press, 2015. (Unit-III)
3. John G. Hayes and A. Goodarzi, —Electric Powertrain - Energy Systems, Power electronics and drives for Hybrid, electric and fuel cell vehicles‖, Wiley, 2018. (Unit-IV & V)

REFERENCES:

1. James Larminie, John Lowry, —Electric Vehicle Technology Explained‖, Wiley, 2 nd Edition 2012.

WEB RESOURCES:

1. https://nptel.ac.in/courses/108106170
2. https://onlinecourses.nptel.ac.in/noc22_ee53
3. https://onlinecourses.nptel.ac.in/noc21_ee112

IV Year B.Tech. EEE – I Semester

23EET21b	**HVDC AND FACTS (Professional Elective -IV)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives: To get the student exposed to:

- High voltage DC transmission systems
- Flexible AC transmission systems
- Various configurations of the above, Principle of operation, Characteristics of various FACTS devices

Course Outcomes:

CO1: Remember various conventional control mechanisms, transmission networks. **-L1**

CO2: Understand the necessity of HVDC systems as emerging transmission networks**. -L2**

CO3: Understand the necessity of reactive power compensation devices. **-L2**

CO4: Design equivalent circuits of various HVDC system configurations. **-L5**

CO5: Design and analysis of various FACTS devices. **-L5**

UNIT I

Introduction:

Electrical Transmission Networks, Conventional Control Mechanisms-Automatic Generation Control, Excitation Control, Transformer Tap-Changer Control, Phase-Shifting Transformers; Advances in Power-Electronic Switching Devices, Principles and Applications of Semiconductor Switches; Limitations of Conventional Transmission Systems, Emerging Transmission Networks, HVDC and FACTS. Concepts of virtual inertia

UNIT II

High Voltage Dc Transmission – I:

Types of HVDC links - Monopolar, Homopolar, Bipolar and Back-to-Back, Advantages and disadvantages of HVDC Transmission, Analysis of Graetz circuit, Analysis of bridge circuit without overlap, Analysis of bridge with overlap less than 60^0, Rectifier and inverter characteristics, complete characteristics of rectifier and inverter, Equivalent circuit of HVDC Link.

UNIT III

High Voltage DC Transmission – II:

Desired features and means of control, control of the direct current transmission link, Constant current control, Constant ignition angle control, Constant extinction angle control, Converter firing- angle control-IPC and EPC, frequency control and Tap changer control, Starting, Stopping and Reversal of power flow in HVDC links.

UNIT IV

Flexible AC Transmission Systems-I:

Types of FACTS Controllers, brief description about various types of FACTS controllers, Operation of 6-pulse converter, Transformer Connections for 12-pulse, 24-pulse and 48-pulse operation, principle of operation of various types of Controllable shunt VAR Generation, Principle of switching converter type shunt compensator, principles of operation of various types of Controllable Series VAR Generation, Principle of Switching Converter type series compensator.

UNIT V

Flexible AC Transmission Systems-II:

Unified Power Flow Controller (UPFC) – Principle of operation, Transmission Control Capabilities, Independent Real and Reactive Power Flow Control; Interline Power Flow Controller (IPFC) – Principle of operation and Characteristics, UPFC and IPFC control structures (only block diagram description), objectives and approaches of voltage and phase angle regulators

Textbooks:

1. Narain G. Hingorani and Laszlo Gyugyi, Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems, IEEE Press, Wiley-Interscience, New Jersey, 2000.
2. E.W. Kimbark, Direct current transmission, Vol. I, Wiley Interscience, New York, 1971.

Reference Books:

1. K R Padiyar, FACTS Controllers in Power Transmission and Distribution, New Age International Publishers, New Delhi, 2007.
2. AnriqueAcha, Claudio R. Fuerte-Esquivel, Hugo Ambriz-Pérez and César Angeles-Camacho, FACTS: Modelling and Simulation in Power Networks, John Wiley & Sons, West Sussex, 2004.
3. R Mohan Mathur and Rajiv K Varma, Thyristor-Based FACTS Controllers for Electrical Transmission Systems, IEEE Press, Wiley-Interscience, New Jersey, 2002.

Online Learning Resources:

1. https://nptel.ac.in/courses/108104013,
2. https://nptel.ac.in/courses/108107114

IV Year B.Tech. EEE – I Semester

23EET22a	**MODERN CONTROL THEORY (Professional Elective-V)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Preamble:

This subject aims to study state space, design of state feedback controllers and state observers, describing function and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

Course Objectives:

CO1: To familiarize the state space representation in controllable, observable, diagonal and Jordan canonical forms. L2

CO2: Introduce the concept of controllability and observability teststhrough canonical forms and design of state feedback controller by pole placement technique and State Observer design. L3

CO3: Analysis of a nonlinear system using describing function approach. L4

CO4: Illustrate the Lypanov's method of stability analysis for linear and non-linear continuous time autonomous systems. L4

CO5: Formulation of Euler Laugrange equation for the optimization of typical functional and solutions. L4

Course Outcomes:

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

CO1: Analyse different canonical forms - solution of State equation. -L4

CO2: Design of control system using the pole placement technique is given after introducing the concept of controllability and observability.-L5

CO3: Analyze nonlinear system using describing function technique and phase plane analysis. -L4

CO4: Examine the stability analysis using Lyapunov method. -L3

CO5: Illustrate the Minimization of functional using calculus of variation - state and quadratic regulator problems. -L3

UNIT I

State Space Analysis:

State Space Representation – Canonical forms – Controllable canonical form – Observable canonical form - Jordan Canonical Form - Solution of state equation – State transition matrix.

UNIT II

Controllability - Observability and Design of Pole Placement:

Tests for controllability and observability for continuous time systems – Time varying case – Minimum energy control – Time invariant case – Principle of duality – Controllability and observability form Jordan canonical form and other canonical forms – Effect of state feedback on controllability and observability – Design of state feedback control through pole placement.

UNIT III

Nonlinear Systems:

Introduction to nonlinear systems - Types of nonlinearities. Introduction to phase–plane analysis - Singular points; Describing function - basic concepts - Describing functions of non- linearities.

UNIT IV

Stability Analysis By Lyapunov Method:

Stability in the sense of Lyapunov – Lyapunov 's stability and Lyapunov's instability theorems – Direct method of Lyapunov for the linear and nonlinear continuous time autonomous systems.

UNIT V

Calculus Of Variations:

Minimization of functional of single function – Constrained minimization – Minimum principle – Control variable inequality constraints – Control and state variable inequality constraints –Euler lagrangine equation.

Text Books:

1. Modern Control System Theory – by M. Gopal - New Age International Publishers - 2ndedition - 1996
2. Modern Control Engineering – by K. Ogata - Prentice Hall of India - 3rd edition - 1998.

Reference Books:

1. Automatic Control Systems by B.C. Kuo - Prentice Hall Publication.
2. Control Systems Engineering by I.J. Nagarath and M.Gopal - New Age International (P) Ltd.
3. Digital Control and State Variable Methods – by M. Gopal - Tata Mc Graw–Hill Companies - 1997.
4. Systems and Control by Stainslaw H. Zak - Oxford Press - 2003.
5. Optimal control theory: an Introduction by Donald E.Kirk by Dover publications.

IV Year B.Tech. EEE – I Semester

23EET22b	**SWITCHED MODE POWER CONVERSION**	**L**	**T**	**P**	**C**
	(Professional Elective -V)	**3**	**0**	**0**	**3**

Course Objectives: By the end of the course, the student will be able to

- Understand basic concepts of DC-DC converters
- Understand the concepts of resonant converters and their classification, various types of multilevel inverters, power conditioners, UPS and filters.
- Apply various modulation and harmonic elimination techniques over the converters.
- Analyze the state space modelling of various types of converters.
- Design inductor and transformer for various power electronic applications.

Course Outcomes:

CO1: Remember basic concepts of various converters. -L1

CO2: Understand the problems and to design of various DC-DC converters, advanced converters of SMPCs. -L2

CO3: Evaluate the performance of resonant converters. -L3

CO4: Analyze the performance characteristics of 1-ϕ and 3-ϕ inverters with single/multi levels, power conditioners, UPS and filters. -L3

CO5:Design various applications of the above in Power Systems, EVE, Renewable Energy Systems, etc. -L5

UNIT I

DC-DC Converters:

Principles of step-down and step-up converters – Analysis and state space modelling of Buck, Boost, Buck- Boost and Cuk converters – Numerical Examples

UNIT II

Switching Mode Power Converters:

Analysis and state space modelling of flyback, Forward, Luo, Half bridge and full bridge converters- control circuits and PWM techniques – Numerical Examples

UNIT III

Resonant Converters:

Introduction- classification- basic concepts- Resonant switch- Load Resonant converters- ZVS, Clamped voltage topologies- DC link inverters with Zero Voltage Switching- Series and parallel Resonant inverters- Voltage control – Numerical Examples

UNIT IV

DC-AC Converters:

Single phase and three phase inverters, control using various (sine PWM, SVPWM and advanced modulation) techniques, various harmonic elimination techniques- Multilevel inverters- Concepts - Types: Diode clamped- Flying capacitor- Cascaded types- Applications.

UNIT V

Power Conditioners, UPS & Filters:

Introduction- Power line disturbances- Power conditioners –UPS: offline UPS, Online UPS, Applications – Filters: Voltage filters, Series-parallel resonant filters, filter without series capacitors, filter for PWM VSI, current filter, DC filters – Design of inductor and transformer for PE applications – Selection of capacitors.

Textbooks:

1. Power Electronics: Essentials and Applications by L. Umanand, Wiley, 2009
2. M.H. Rashid – Power Electronics handbook, Elsevier Publication, 2001.
3. Course material on Switched Mode Power Conversion by V Ramanarayanan, Dept. of Electrical Engg. IISc. Bangalore.

Reference Books:

1. Philip T. Krein, —Elements of Power Electronics‖, Oxford University Press, 2012
2. Ned Mohan, Tore.M.Undeland, William.P.Robbins, Power Electronics converters, Applications and design, 3rd Edition, John Wiley and Sons, 2006
3. M.H. Rashid, Power Electronics circuits, devices and applications, 3rd Edition Prentice Hall of India New Delhi, 2007.

Online Learning Resources:

1. https://nptel.ac.in/courses/108108036
2. https://nptel.ac.in/courses/108105180

IV Year B.Tech. EEE – I Semester

23EET22c	**ELECTRICAL DISTRIBUTION SYSTEM (Professional Elective-V)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives: To make the students:

- To know about fundamental aspects of distribution system, principle of distribution substations.
- To know about classification of various loads.
- To understand difference between conventional load flow studies of power system and distribution system load flow.
- To know about evaluation of voltage droop and power loss calculations, distribution automation and management system, SCADA.

Course Outcomes (CO): After completing the course, the student should be able to do the following:

CO 1 : Understand fundamental aspects of distribution system and various factors affecting the distribution systems. **-L2**

CO 2: Analysis of substations and modelling of loads. **-L3**

CO 3: Understand difference between conventional load flow studies of power system and distribution system load flow. **-L2**

CO 4: Evaluation of voltage drop and power loss calculations and capacitor location and cost analysis**.-L3**

CO 5: Analyse the concepts of SCADA, Automation distribution system and management**. -L3**

UNIT I

Distribution System Fundamentals:

Brief description about electrical power transmission and distribution systems, Different types of distribution sub-transmission systems, Substation bus schemes, Factors effecting the substation location, Factors effecting the primary feeder rating, types of primary feeders, Factors affecting the primary feeder voltage level, Factors effecting the primary feeder loading.

UNIT II

Distribution System Substations and Loads:

Substations: Rating of a distribution substation for square and hexagonal shaped distribution substation, Service area with ―n‖ primary feeders, K constant, Radial feeder with uniformly and non-uniformly distributed loading. Benefits derived through optimal location of substations.

Loads: Various types of loads, Definitions of various terms related to system loading, Distribution transformer loading, feeder loading, Relationship between the Load Factor and Loss Factor, Modelling of star and delta connected loads.

UNIT III

Distribution System Load Flow:

Exact line segment model, Modified line model, approximate line segment model, Step-Voltage Regulators, Line drop compensator, Forward/Backward sweep distribution load flow algorithm – Numerical problems

UNIT IV

Voltage Drop and Power Loss Calculation:

Analysis of non-three phase primary lines, concepts of four-wire multi-grounded common-neutral distribution system, Percent power loss calculation, Distribution feeder cost calculation methods, Capacitor installation types, Series and Shunt Capacitors, Types of three-phase capacitor-bank connections, Procedure for best capacitor location, Economic justification for capacitors – Numerical problems.

UNIT V

Distribution Automation:

Distribution automation, distribution management systems, distribution automation system functions, Basic SCADA system, Consumer Information Service (CIS) – Geographical Information System (GIS) – Automatic Meter Reading (AMR), Outage management, decision support applications, substation automation, control feeder automation.

Textbooks:

1. Distribution System Modelling and Analysis, William H. Kersting, CRC Press, Newyork, 2002.
2. Electric Power Distribution System Engineering, TuranGonen, McGraw-Hill Inc., New Delhi, 1986.

Reference Books:

1. Control and automation of electrical power distribution systems, James Northcote-Green and Robert Wilson, CRC Press (Taylor & Francis), New York, 2007.
2. Biswarup Das, Power distribution Automation, IET publication, 2016.
3. Dr. M. K. Khedkar, Dr. G.M. Dhole, Electric Power Distribution Automation, Laxmi Publications, First edition, 2017.

Online Learning Resource:

1.https://onlinecourses.nptel.ac.in/noc22_ee126/preview

IV Year B.Tech. EEE – I Semester

23CET24	**BUILDING MATERIALS AND SERVICES (OPEN ELECTIVE-III)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:
The objectives of this course are to make the student :
1. To understand the properties, classifications, and applications of building materials like stones, bricks,
tiles, wood, aluminum, glass, paints, and plastics.
2. To analyze the composition, manufacturing process, and properties of cement and admixtures.
3. To apply knowledge of building components such as lintels, arches, walls, stairs, floors, roofs, foundations, and joinery.
4. To evaluate masonry, mortars, finishing techniques, and formwork systems.
5. To assess various building services including plumbing, ventilation, air conditioning, acoustics, and fire
protection.

Course Outcomes:
Upon successful completion of the course, students will be able 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.

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 / Fibre – 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. Building Materials and Construction – Arora&Bindra, Dhanpat Roy Publications.
2. Building Materials and Construction by G C Sahu, Joygopal Jena McGraw hill Pvt Ltd 2015.
REFRENCE BOOKS:
1. Building Construction by B. C. Punmia, Ashok Kumar Jain andArun Kumar Jain - Laxmi Publications (P)
ltd., New Delh
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/

IV Year B.Tech. EEE – I Semester

23CET25	**ENVIRONMENTAL IMPACT ASSESSMENT (OPEN ELECTIVE-III)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:
The objectives of this course are to make the student 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 (COs):
Upon successful completion of the course, students will be able to:
1. Apply various methodologies for conducting Environmental Impact Assessments.
2. Analyze the impact of land-use changes on soil, water, and air quality.
3. Evaluate the environmental impact on vegetation, wildlife, and conduct risk assessments.
4. Develop environmental audit reports and assess compliance with environmental policies.
5. Interpret and apply environmental acts and regulations related to EIA.

UNIT – I
Concepts and methodologies of EIA
Initial Environmental Examination, Elements of EIA, - Factors Affecting E-I-A Impact Evaluation and
Analysis, Preparation of Environmental Base Map, Classification of Environmental Parameters- Criteria for
The Selection of EIA Methodology, E I A 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 Actives. Procurement of Relevant Soil Quality, Impact Prediction, Assessment of Impact
Significance, Identification and Incorporation of Mitigation Measures. E I Ain 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 An 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. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B. S. Publication, Hyderabad 2nd
edition 2011
2. Environmental Impact Assessment, by Canter Larry W., McGraw-Hill education Edi (1996)

REFRENCE BOOKS:
1. Environmental Engineering, by Peavy, H. S, Rowe, D. R, Tchobanoglous, G.Mc-Graw Hill International
Editions, New York 1985.
2. Environmental Science and Engineering, by Suresh K. Dhaneja, S.K., Katania& Sons Publication, New
Delhi
3. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke, Prentice Hall Publishers.
4. Environmental Pollution and Control, by H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi.

Online Learning Resources:
https://archive.nptel.ac.in/courses/124/107/124107160/

IV Year B.Tech. EEE – I Semester

23MET23	**3D PRINTING TECHNOLOGIES (OPEN ELECTIVE-III)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course objectives: The objectives of the course are to

1 Understand the fundamental concepts of prototyping and distinguish between traditional and rapid prototyping methods.

2 Demonstrate the working principles, materials, and applications of solid-, liquid-, and powder-based RP systems.

3 Define the processes and classifications of rapid tooling and reverse engineering techniques.

4 Identify common errors in 3D printing and evaluate pre-processing, processing, and post-processing issues.

5 Familiarize RP-related software and its role in applications such as design, manufacturing, and medical fields.

Course Outcomes: On successful completion of the course, the student will be able to,

1 Define and explain the evolution and need for rapid prototyping in modern product development.

2 Compare and contrast various 3D printing technologies based on working principles, materials, and limitations.

3 Apply knowledge of rapid tooling and reverse engineering techniques for industrial and design applications.

4 Diagnose and interpret different types of errors encountered in 3D printing processes and recommend solutions.

5 Use RP-specific software tools to manipulate STL files and prepare models for printing in real-world scenarios.

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.

Textbooks: 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, Bren Stucker,―Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing‖, Springer, 2/e, 2010.

Reference 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:

- NPTEL Course on Rapid Manufacturing.
- https://nptel.ac.in/courses/112/104/112104265/
- https://www.hubs.com/knowledge-base/introduction-fdm-3d-printing/
- https://slideplayer.com/slide/6927137/
- https://www.mdpi.com/2073-4360/12/6/1334
- https://www.centropiaggio.unipi.it/sites/default/files/course/material/2013-11-29%20-%20FDM.pdf
- https://lecturenotes.in/subject/197
- https://www.cet.edu.in/noticefiles/258_Lecture%20Notes%20on%20RP-ilovepdfcompressed.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1517967201.pdf
- https://www.youtube.com/watch?v=NkC8TNts4B4.

IV Year B.Tech. EEE – I Semester

23CET12	**MICROPROCESSORS AND MICROCONTROLLERS (OPEN ELECTIVE-III)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:

- To comprehend the architecture, operation, and configurations of the 8086 microprocessors.
- To get familiar with 8086 programming concepts, instruction set, and assembly language development tools. 8. To study the interfacing of 8086 with memory, peripherals, and controllers for various applications.
- To learn the architecture, instruction set, and programming of the 8051 microcontrollers.
- To understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.

Course Outcomes:

1. At the end of this course, the students will be able to
2. Gain knowledge on the architecture, operation, and configurations of the 8086 microprocessors.
3. Get familiar with 8086 programming concepts, instruction set, and assembly language development tools.
4. Know the interfacing of 8086 with memory, peripherals, and controllers for various applications.
5. Learn the architecture, instruction set, and programming of the 8051 microcontrollers.
6. Understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.

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

Textbooks:

1. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rdEdition,1994.

2. K M Bhurchandi, 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:

1. Ramesh S Gaonkar, Microprocessor Architecture Programming and Applications with the 8085, 6th edition, Penram

2. International Publishing, 2013.

3.Kenneth J. Ayala, The 8051 Microcontroller, 3rd edition, Cengage Learning, 2004.

IV Year B.Tech. EEE – I Semester

23CST32	**DATA BASE MANAGEMENT SYSTEM (OPEN ELECTIVE-III)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:

- To introduce the fundamental concepts of database systems and data modeling.
- To provide knowledge on relational databases and SQL for data retrieval and manipulation.
- To understand database design principles using normalization and ER modeling.
- To study transaction management, concurrency control, and database recovery.
- To explore emerging database technologies and architectures including NoSQL.

Course Outcomes (COs):

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

1. CO1: Understand the basic concepts of database systems and their architecture.
2. CO2: Apply ER modeling and relational algebra for database design.
3. CO3: Analyze and implement normalization techniques for schema refinement.
4. CO4: Evaluate transaction management techniques, concurrency control, and recovery.
5. CO5: Explore non-relational databases and recent trends in database systems.

UNIT I:

Introduction to Databases Database System Applications and Purpose, View of Data: Data Abstraction and Data Independence, Database Users and Administrators, DBMS Architecture and Data Models, ER Model: Entities, Attributes, Relationships, ER Diagrams, Reduction of ER Model to Tables

UNIT II:

Relational Model and Algebra Structure of Relational Databases, Relational Model Concepts and Integrity Constraints, Relational Algebra: Selection, Projection, Set Operations, Joins, Tuple Relational Calculus, Introduction to SQL: DDL, DML, DCL, Advanced SQL: Sub queries, Joins, Views, Indexes

UNIT III:

Database Design and Normalization Schema Design and Logical Database Design, Functional Dependencies, Normal Forms: 1NF, 2NF, 3NF, BCNF, Decomposition and Lossless Join, Dependency Preservation, Multi-Valued and Join Dependencies.

UNIT IV:

Transaction Management and Concurrency Control Concept of a Transaction, ACID Properties, Serializability and Schedules, Concurrency Control: Lock-Based, Times tamp Based Protocols,

Deadlock Handling, Recovery Techniques: Log-Based, Shadow Paging

UNIT V:

Advanced Topics and NoSQL Databases Distributed Databases and Parallel Databases, Introduction to NoSQL: Types – Document, Columnar, Key-Value, Graph,

CAP Theorem, MongoDB: Basics and CRUD Operations, Big Data and New SQL Overview, Case Studies on Real-World Databases

Textbooks:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan – Database System Concepts, 7th Edition, McGraw Hill

2. Ramez Elmasri, Shamkant B. Navathe – Fundamentals of Database Systems, 7th Edition, Pearson Education

Reference Books:

1. C.J. Date – An Introduction to Database Systems, 8th Edition, Addison-Wesley

2. Raghu Ramakrishnan, Johannes Gehrke – Database Management Systems, 3rd Edition, McGraw Hill

3. Pramod J. Sadalage & Martin Fowler – NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot

Persistence, Pearson

Online Resources & Courses:

1. NPTEL – Database Management Systems by IIT Madras

2. Coursera – Databases by Stanford University

3. Khan Academy – Intro to SQL

4. MongoDB University – Free Courses on NoSQL Databases

5. W3Schools SQL Tutorial

6. GeeksforGeeks – DBMS Concepts and Practice Problems

IV Year B.Tech. EEE – I Semester

23CST18b	**CYBER SECURITY**	**L**	**T**	**P**	**C**
	(OPEN ELECTIVE-III)	**3**	**0**	**0**	**3**

Course Objectives:

1. To introduce the concept of cybercrime and its impact on information security, and provide an overview of
cybercriminal behavior and various classifications of cybercrimes.
2. To explore the methodologies used by cybercriminals to plan and execute attacks, including techniques like social
engineering, botnets, and cloud-related threats.
3. To understand the security risks associated with mobile and wireless devices, and examine countermeasures for
securing mobile computing in organizational environments.
4. To familiarize students with the tools and techniques used in committing cybercrimes, such as phishing, malware,
DoS/DDoS attacks, and code-based exploits.
5. To analyze the implications of cybercrime for organizations, including the cost of cyber attacks, intellectual
property issues, and challenges posed by social computing and web-based threats.

Course Outcomes:

After completion of the course, students will be able to

1. Understand the fundamentals of cybercrime and information security, and explain the legal and global
perspectives, especially with reference to Indian IT Act 2000.
2. Analyze how cybercriminals plan and execute cyber offenses using techniques like social engineering, cyber
stalking, and botnets, including threats posed by cloud computing.
3. Evaluate the security challenges of mobile and wireless devices and formulate measures to secure mobile
environments within an organization.
4. Identify and explain various cyber attack tools and methods such as phishing, keyloggers, Trojans, and SQL
injection used in committing cybercrimes.
5. Assess the organizational implications of cybercrimes, including IPR issues, social media risks, and formulate strategies to mitigate security and privacy challenges.

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.

Textbooks:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil

Belapure, Wiley INDIA.

Reference Books:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.

2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J.DavidIrwin.CRC Press T&F Group

Online Learning Resources:

http://nptel.ac.in/courses/106105031/40

http://nptel.ac.in/courses/106105031/39

http://nptel.ac.in/courses/106105031/38

IV Year B.Tech. EEE – I Semester

23BST30	**WAVELET TRANSFORMS AND ITS APPLICATIONS (OPEN ELECTIVE-III)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:

After successful completion of this course, the students should be able to:

- CO1: Understand wavelets and wavelet basis and characterize continuous and discrete wavelet transforms
- CO2: Illustrate the multi resolution analysis ad scaling functions
- CO3: Implement discrete wavelet transforms with multirate digital filters
- CO4: Understand multi resolution analysis and identify various wavelets and evaluate their time- frequency resolution properties.
- CO5: 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 Multiresolution Formulation of Wavelet Systems

Signal Spaces -The Scaling Function -Multiresolution 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

Multiresolution versus Time-Frequency Analysis- Periodic versus Nonperiodic 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, Ramesh A. Gopinath, ―Introduction to Wavelets and Wavelets Transforms‖, Prentice Hall,

(1997).

2. James S. Walker, ―A Primer on Wavelets and their Scientific Applications‖, CRC Press, (1999)..

REFERENCES:

1. RaghuveerRao, ―Wavelet Transforms‖, Pearson Education, Asia

2. C. S. Burrus, Ramose and A. Gopinath, Introduction to Wavelets and Wavelet Transform, Prentice Hall Inc.

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.htm

4.https://jqichina.wordpress.com/wp-content/uploads/2012/02/ten-lectures ofwaveletsefbc88e5b08fe6b3a2e58d81e8aeb2efbc891.pdf

IV Year B.Tech. EEE – I Semester

23BST31	**SMART MATERIALS AND DEVICES (OPEN ELECTIVE-III)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:

- To provide exposure to smart materials and their engineering applications.
- To impart knowledge on the basics and phenomenon behind the working of smart materials
- To explain the properties exhibited by smart materials
- To educate various techniques used to synthesize and characterize smart materials
- To identify the required smart material for distinct applications/devices

Course Outcomes:

CO1: Identify key discoveries that led to modern applications of shape memory materials,describe the two phases in shape memory alloys.

CO2: Describe how different external stimuli (light, electricity, heat, stress, and magnetism) influence smart material properties.

CO3: Summarize various types of synthesis of smart materials

CO4 :Analyze various characterization techniques used for smart materials .

CO5: Interpret the importance of smart materials in various devices .

UNIT I

Introduction to Smart Materials 9H

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 9H

Optical, Electrical, Dielectric, Piezoelectric, Ferroelectric, Pyroelectric and Magnetic properties of smart materials.

UNIT III

Synthesis of Smart Materials 9H

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 9H

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 9H

Devices based on smart materials: Shape memory alloys in robotic hands, piezoelectric based devices, MEMS and intelligent devices.

Textbooks:

1. YaserDahman, 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. Gauenzi,P.,Smart Structures, Wiley, 2009.

2. MahmoodAliofkhazraei, Handbook of functional nanomaterials, Vol (1&2), Nova Publishers, 2014

3. Handbook of Smart Materials, Technologies, and Devices: Applications of Industry,4.0,Chaudhery

MustansarHussain, Paolo Di Sia, Springer,2022.

4.Fundamentals of Smart Materials,Mohsen Shahinpoor, Royal Society of Chemistry, 2020

NPTEL course link: https://onlinecourses.nptel.ac.in/noc22_me17/preview

IV Year B.Tech. EEE – I Semester

23BST34	**INTRODUCTON TO QUANTUM MECHANICS (OPEN ELECTIVE-III)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:

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

CO1: Explain the key principles of quantum mechanics and wave-particle duality .

CO2: Apply Schrödinger equations to solve one-dimensional quantum problems .

CO3: Solve quantum mechanical problems using operator and matrix methods.

CO4: Evaluate quantum states using Dirac notation and expectation values.

CO5: Analyze angular momentum and spin systems using Pauli matrices and operators. L

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. ClebschGordon coefficients. Rigid Rotator: Eigen functions and Eigen values.

BOOKS FOR STUDY:

1. Quantum Mechanics. Vol 1, A. MessaiaNoth-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 PrakashNath& 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.

NPTEL courses link :

4. https://archive.nptel.ac.in/courses/115/101/115101107/

5. https://archive.nptel.ac.in/courses/122/106/122106034/

6. https://nptel.ac.in/courses/115106066

IV Year B.Tech. EEE – I Semester

23BST32	**GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT** **(OPEN ELECTIVE-III)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

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

CO1: Apply the Green chemistry Principles for day to day life as well as synthesis, describe the sustainable development and green chemistry, Explain economic and un-economic reactions, Demonstrate Polymer recycling.

CO2: Explain Heterogeneous catalyst and its applications in Chemical and Pharmaceutical Industries,

Differentiate Homogeneous and Heterogeneous catalysis, Identify the importance of Bio and Photo Catalysis, Discuss Transition metal and Phase transfer Catalysis

CO3: Demonstrate Green solvents and importance, Discuss Supercritical carbondioxide, Explain Supercritical water, recycling of green solvents.

CO4: Describe importance of Biomass and Solar Power, Illustrate Sonochemistry, Apply Green Chemistry for Sustainable Development; discuss the importance of Renewable resources, mechanochemical synthesis.

CO5: Discuss Alternative green methods like Photoredox catalysis, single electron transfer reactions (SET), Photochemical Reactions, Microwave-assisted Reactions and Sonochemical reactions, examples and applications.

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

References :
1. Green Chemistry for Environmental Sustainability, First Edition, Sanjay K. Sharma and AckmezMudhoo,
CRC Press, 2010.
2. Edited by AlvisePerosa and Maurizio Selva , Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH, 2013.
www.android.universityupdates.in | www.universityupdates.in | https://telegram.me/jntua

IV Year B.Tech. EEE – I Semester

23BST33	**EMPLOYABILITY SKILLS (OPEN ELECTIVE-III)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

To encourage all round development of the students by focusing on productive skills

- To make the students aware of Goal setting and writing skills
- To enable them to know the importance of presentation skills in achieving desired goals.
- To help them develop organizational skills through group activities
- To function effectively with heterogeneous teams

Course Outcomes :

CO1: Understand the importance of goals and try to achieve them
CO2: Explain the significance of self-management
CO3: Apply the knowledge of writing skills in preparing eye-catchy resumes
CO4: Analyse various forms of Presentation skills
CO5: Judge the group behaviour appropriately
CO6: Develop skills required for employability

UNIT - I
Goal Setting and Self-Management

Definition, importance, types of Goal Setting – SMART Goal Setting – Advantages-Motivation – Intrinsic and
Extrinsic Motivation – Self-Management - Knowing about self – SWOC Analysis

UNIT – II
Writing Skills Lecture Hrs
Definition, significance, types of writing skills – Resume writing Vs CV Writing - E-Mail writing, Cover Letters E-Mail Etiquette -SoP (Statement of Purpose)

UNIT - III
Technical Presentation Skills
Nature, meaning & significance of Presentation Skills – Planning, Preparation, Presentation, Stage Dynamics –
Anxiety in Public speaking (Glossophobia)- PPT & 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 & 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,2014.Cambridge Publisher.
2.Alka Wadkar. Life Skills for Success, Sage
Publications, 2016.

Reference Books:

1. Gangadhar Joshi. Campus to Corporate Paperback , Sage Publications. 2015
2. Sherfield Montogomery Moody,Cornerstone Developing Soft Skills, Pearson Publications. 4 Ed. 2008
3. Shikha Kapoor. Personality Development and Soft Skills - Preparing for Tomorrow .1 Edition, Wiley, 2017.
4. M. Sen Gupta, Skills for Employability, Innovative Publication, 2019.
5. Steve Duck and David T McMahan, The Basics f Communication Skills A Relational Perspective, Sage
press, 2012.
Online Learning Resources:
10. https://youtu.be/gkLsn4ddmTs
11. https://youtu.be/2bf9K2rRWwo
12. https://youtu.be/FchfE3c2jzc
13. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
14. https://www.youtube.com/c/skillopedia/videos
15. https://onlinecourses.nptel.ac.in/noc25_hs96/preview
16. https://onlinecourses.nptel.ac.in/noc21_hs76/preview
17. https://archive.nptel.ac.in/courses/109/107/109107172/#
18. https://archive.nptel.ac.in/courses/109/104/109104107/

IV Year B.Tech. EEE – I Semester

23CET26	**GEO-SPATIAL TECHNOLOGIES** (OPEN ELECTIVE-IV)	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:

The objectives of this course are to make the student :

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. Understand raster-based spatial analysis techniques, including query, overlay, and cost-distance analysis.
2. Analyze vector-based spatial analysis techniques such as topology, overlay, and proximity analysis.
3. Apply network analysis techniques for geocoding, shortest path analysis, and location-allocation problems.
4. Evaluate surface andgeostatistical analysis methods, including terrain modeling, watershed analysis, and spatial interpolation.
5. Assess GIS customization, Web GIS, and mobile mapping techniques for real-world applications.

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, 4th Ed., Tata McGraw Hill Edition, 2008.
2. Lo, C.P. andYeung, Albert K.W., Concepts and Techniques of Geographic Information Systems Prentice Hall, 2002.

REFRENCE BOOKS:

1. Michael N. Demers, Fundamentals of Geographic Information Systems, Wiley,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 Pub.,2008

Online Learning Resources:

https://archive.nptel.ac.in/courses/105/105/105105202/

https://onlinecourses.nptel.ac.in/noc19_cs76/preview

IV Year B.Tech. EEE – I Semester

23CET27	**SOLID WASTE MANAGEMENT (OPEN ELECTIVE-IV)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

The objectives of this course are to make the student :
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:

1. Understand the types, sources, and characteristics of solid waste, along with regulatory frameworks.
2. Analyze engineering systems for solid waste collection, storage, and transportation.
3. Apply resource and energy recovery techniques for sustainable solid waste management.
4. Evaluate landfill design, construction, and environmental impact mitigation strategies.
5. Assess hazardous waste management techniques, including biomedical and e-waste

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 - Recoveryof 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:

Tchobanoglous G, Theisen H and Vigil SA Integrated Solid Waste Management, Engineering Principles and Management Issues McGraw-Hill, 1993.
2. Vesilind PA, Wortell W and Reinhart D, Solid Waste Engineering Brooks/Cole Thomson Learning Inc., 2002.

REFRENCE BOOKS:

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.npteLac.in/courses/120/108/120108005/

IV Year B.Tech. EEE – I Semester

23MET24	**TOTAL QUALITY MANAGEMENT (OPEN ELECTIVE-IV)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

1. Familiarize the basic concepts of Total Quality Management.
2. Expose with various quality issues in Inspection.
3. Gain Knowledge on quality control and its applications to real time..
4 .Understand the extent of customer satisfaction by the application of various quality concepts.
5. Demonstrate the importance of Quality standards in Production

Course Outcomes:

1. Define and develop on quality Management philosophies and analyze quality costs frameworks.
2 .Understanding of the historical development of Total Quality Management (TQM), implementation, and real-world applications through case studies.
3. Evaluate the cost of poor quality, process effectiveness and efficiency to analyze areas for improvement.
4. Apply benchmarking and business process reengineering to improve management processes.
5. Demonstrate the set of indications to evaluate performance excellence of an organization

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:

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.

Reference 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/

IV Year B.Tech. EEE – I Semester

23CET29	**TRANSDUCERS AND SENSORES (OPEN ELECTIVE-IV)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

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:

After completing the course, the student 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.

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‖, Dhanpat Rai& Co.
3rd edition Delhi, 2010.
2. Rangan C.S, Sarma G.R and Mani V S V, ―Instrumentation Devices and Systems‖, TATA McGraw Hill
publications, 2007.

REFERENCE BOOKS

1. Doebelin. E.O, ―Measurement Systems Application and Design‖ ,Mc Graw Hill International, New York, 2004.
2. Nakra B.C and Chaudhary K.K , ―Instrumentation Measurement and Analysis‖, Second Edition, Tata McGraw Hill Publication Ltd.2006.

IV Year B.Tech. EEE – I Semester

23CST33	**INTRODUCTION TO COMPUTER NETWORKS (OPEN ELECTIVE-IV)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:
The course is designed to:
- Understand the basic concepts of Computer Networks.
- Introduce the layered approach for design of computer networks
- Expose the network protocols used in Internet environment
- Explain the format of headers of IP, TCP and UDP
- Familiarize with the applications of Internet
- 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 Lecture:
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 Lecture:
Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding
Window Protocols (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 Lecture :
Routing Algorithms, Internetworking, The Network Layer in The Internet (Textbook 1)

UNIT IV:

The Transport Layer Lecture:

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

UNIT V:

The Application Layer Lecture:

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)

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 Approach, 6th Edition, Pearson,
2019.

Reference Books:

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 Resources:

1. https://nptel.ac.in/courses/106105183/25
2. https://www.nptelvideos.in/2012/11/computer-networks.html
3. https://nptel.ac.in/courses/106105183/3

IV Year B.Tech. EEE – I Semester

23CST23d	**INTERNET OF THINGS (OPEN ELECTIVE-IV)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:
• Understand the basics of Internet of Things and protocols.
• Discuss the requirement of IoT technology
• Introduce some of the application areas where IoT can be applied.
• 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
• Understand general concepts of Internet of Things.
• Apply design concept to IoT solutions
• Analyze various M2M and IoT architectures
• Evaluate design issues in IoT applications
• Create IoT solutions using sensors, actuators and Devices

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 toUnmanned 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.

Textbooks:
1. Vijay Madisetti and ArshdeepBahga, ―Internet of Things (A Hands-on-Approach)‖, 1st Edition, VPT, 2014.
2. Handbook of unmanned aerial vehicles, K Valavanis;George J Vachtsevanos, New York, Springer, Boston,
Massachusetts : Credo Reference, 2014. 2016.

Reference Books:
1. Jan Holler, VlasiosTsiatsis, 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. ArshdeepBahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
3. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, 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: 9781-4493- 9357-1
6. DGCA RPAS Guidance Manual, Revision 3 – 2020
7. Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs, John Baichtal
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

IV Year B.Tech. EEE – I Semester

23CST34	**INTRODUCTION TOQUANTUM COMPUTING (OPEN ELECTIVE-IV)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:

- To introduce the principles and mathematical foundations of quantum computation.
- To understand quantum gates, circuits, and computation models.
- To explore quantum algorithms and their advantages over classical ones.
- To develop the ability to simulate and write basic quantum programs.
- To understand real-world applications and the future of quantum computing in AI, cryptography, and optimization.

Course Outcomes:

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

1. Explain the fundamental concepts of quantum mechanics used in computing.
2. Construct and analyze quantum circuits using standard gates.
3. Apply quantum algorithms like Deutsch-Jozsa, Grover‘s, and Shor‘s.
4. Develop simple quantum programs using Qiskit or similar platforms.
5. Analyze applications and challenges of quantum computing in real-world domains.

UNIT I:

Fundamentals of Quantum Mechanics and Linear Algebra

Classical vs Quantum Computation, Complex Numbers, Vectors, and Matrices, Hilbert Spaces and Dirac Notation,
Quantum States and Qubits, Superposition and Measurement, Tensor Products and Multi-Qubit Systems.

UNIT II:

Quantum Gates and Circuits

Quantum Logic Gates: Pauli, Hadamard, Phase, Controlled Gates and CNOT, Unitary Operations and Reversibility,
Quantum Circuit Representation, Quantum Teleportation, Simulation of Quantum Circuits.

UNIT III:

Quantum Algorithms and Complexity

Quantum Parallelism and Interference, Deutsch and Deutsch-Jozsa Algorithms, Grover‘s Search Algorithm, Shor‘s
Factoring Algorithm, Quantum Fourier Transform, Complexity Classes: BQP, P, NP, and QMA.

UNIT IV:

Quantum Programming and Simulation Platforms

Introduction to Qiskit and IBM Quantum Experience, Writing Quantum Circuits in Qiskit, Measuring Qubits and Results,
Classical-Quantum Hybrid Programs, Noisy Intermediate-Scale Quantum (NISQ) Systems, Limitations and Current State
of Quantum Hardware.

UNIT V:

Applications and Future of Quantum Computing

Quantum Machine Learning: Basics and Models, Quantum Cryptography and Quantum Key Distribution, Quantum
Algorithms in AI and Optimization, Quantum Advantage and Supremacy, Ethical and Societal Impact of Quantum
Technologies, Future Trends and Research Directions.

Textbooks:

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, Michele Mosca, An Introduction to Quantum Computing, Oxford University
Press, 2007.
3. Scott Aaronson, Quantum Computing Since Democritus, Cambridge University Press, 2013.

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 Quantum

IV Year B.Tech. EEE – I Semester

23BST35	**FINANCIAL MATHEMATICS**	**L**	**T**	**P**	**C**
	(OPEN ELECTIVE-IV)	**3**	**0**	**0**	**3**

Course Objectives:

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:

After successful completion of this course, the students should be able to:

COs Statements Blooms level

CO1: Explain fundamental financial concepts, including arbitrage, valuation, and risk.

CO2:Apply stochastic models, including Brownian motion and Stochastic Differential Equations (SDEs), in financial contexts. L3 (Apply)

CO3:Analyze mathematical techniques for pricing options and financial derivatives. L4 (Analyze)

CO4 Evaluate interest rate models and bond pricing methodologies. L5 (Evaluate)

CO5:Utilize computational techniques such as Monte Carlo simulations for financial modeling. L3 (Apply)

UNIT-I: Asset Pricing and Risk Management (08)

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 (08)

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 (08)

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 (08)

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 (08)

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.

Textbooks:

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:

• MIT– Mathematics for Machine Learning https://ocw.mit.edu

• Coursera – Financial Engineering and Risk Management (Columbia University) https://www.coursera.org/

• National Stock Exchange (NSE) India – Financial Derivatives https://www.nseindia.com/

IV Year B.Tech. EEE – I Semester

23BST36	**SENSORS AND ACTUATORS FOR ENGINEERING APPPLICATIONS (OPEN ELECTIVE-IV)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:

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 (COs)

CO No.	**Course Outcome**
CO1	Explain the basic principles, characteristics, fabrication techniques of sensors, and working principles of various actuators.
CO2	Explain the working principles and characteristics of temperature and mechanical sensors, including thermistors, thermocouples, strain gauges, tactile and pressure sensors.
CO3	Explain the operating principles and applications of optical and acoustic sensors, including photodetectors, infrared sensors, ultrasonic sensors and microphones.
CO4	Describe the working principles and applications of magnetic and electromagnetic sensors and actuators, including motors, LVDT, RVDT, Hall effect and magneto resistive sensors.
CO5	Explain the operating principles and applications of chemical and radiation sensors, including electrochemical, gas, pH, humidity, ionization and scintillation detectors.

UNIT-I Introduction to Sensors and Actuators 9H

Sensors: Types of sensors: temperature, pressure, strain, active and passive sensors, General characteristics of sensors
(Principles only), Deposition: Chemical Vapor Deposition, Pattern: photolithography and Etching: Dry and Wet Etching.
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 9H

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 9H

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 9H

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 9H

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)

Textbooks:

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.

IV Year B.Tech. EEE – I Semester

23BST37	**CHEMISTRY OF NANOMATERIALS AND APPLICATIONS (OPEN ELECTIVE-IV)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives

- To understand basics and characterization of nanomaterials.
- To understand synthetic methods of nano matrials.
- To apply various techniques for charterization of nanomaterials.
- To understand Studies of Nano-structured Materials
- To enumerate the applications of advanced nanomaterials in engineering

Course Outcomes

CO1: Classify the nanostructure materials; describe scope of nanoscience and importance technology.

CO2: Describe the top-down approach, Explain aerosol synthesis and plasma arc technique, Differentiate chemical vapor deposition method and electrode position method, Discuss about highenergy ball milling.

CO3: Discuss different technique for characterization of nanomaterial, Explain electron microscopy techniques for characterization of nanomaterial, Describe BET method for surface area analysis.

CO4: Explain synthesis and properties and applications of nanaomaterials, Discuss about fullerenes and carbon nanotubes, Differentiate nanomagnetic materials and thermoelectric materials, nonlinear optical materials.

CO5: Illustrate advance engineering applications of Water treatment, sensors, electronic devices, medical domain, civil engineering, chemical engineering, metallurgy and mechanical engineering, food science, agriculture, pollutants degradation.

UNIT – I

Basics and Characterization of Nanomaterials: Introduction, Scope of nanoscience and nanotecnology, 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, highenergy 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, nano wires, Water
treatment, sensors, electronic devices, medical domain, civil engineering, chemical engineering, metallurgy and
mechanical engineering, 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 Nanochemistry; LudovicoCademrtiri and Geoffrey A. Ozin& Geoffrey A. Ozin, Wiley-VCH, 2011.
2. Nanostructures &Nanomaterials; Synthesis, Properties & Applications: Guozhong Cao, Imperial College
Press, 2007.Nanomaterials

IV Year B.Tech. EEE – I Semester

23BST38	**LITERARY VIBES (OPEN ELECTIVE-IV)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objectives:

- To inculcate passion for aesthetic sense and reading skills
- To encourage respecting others‘ experiences and creative writing
- To explore emotions, communication skills and critical thinking
- To educate how books serve as the reflection of history and society
- To provide practical wisdom and duty of responding to events of the times

Course Outcomes

CO1: Identify genres, literary techniques and creative uses of language in literary texts

CO2: Explain the relevance of themes found in literary texts to contemporary, personal and cultural values and to historical forces

CO3: Apply knowledge and understanding of literary texts when responding to others‘ problems and their own and make evidence-based arguments

CO4: Analyze the underlying meanings of the text by using the elements of literary texts

CO5: Evaluate their own work and that of others critically

CO6: 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. Ain‘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
1. Plot & sub-plot and Historical background of the play
2. Themes and Criticism
3. Style and literary elements
4. 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 Autobiography

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-JB Priestly

UNIT V: Novel: Hard Times- Charles Dickens

1. Charles Dickens-Life and works
2. Plot and Historical background of the novel
3. Themes and criticism
4. Style and literary elements
5. Characters and characterization

Text Books:

1. Charles Dickens.Hard Times.(Sangam Abridged Texts) Vantage Press, 1983
2. DENT JC.William Shakespeare. Twelfth Night. Oxford University Press,2016.

References:

1. WJ Long.History of English Literature, Rupa Publications India; First Edition (4 October 2015)
2. RK Kaushik And SC Bhatia. Essays, Short Stories and One Act Plays, Oxford University Press .2018.
3. Dhanvel, SP. 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. Dev Neira, Anjana & Co. Creative Writing: A Beginner's Manual.Pearson India, 2008.

Online Resources

https://www.litcharts.com/poetry/alfred-lord-tennyson/ulysses
https://www.litcharts.com/lit/ain-t-i-a-woman/summary-and-analysis
https://englishliterature.education/articles/poetry-analysis/the-second-coming-by-w-b-yeats-criticalanalysissummary-and-line-by-line-explanation/#google_vignette
https://sirjitutorials.com/where-the-mind-is-without-fear-poem-notes-explanation/
https://www.litcharts.com/lit/twelfth-night/themes
https://smartenglishnotes.com/2021/11/28/the-luncheon-summary-characters-themes-and-irony/

IV Year B.Tech. EEE – I Semester

23EEP11	**POWER SYSTEMS AND SIMULATION LAB (Skill Enhancement Course)**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

Course Objectives:

The objectives of this course include

- To do the experiments (in machines lab) on various power system concepts like determination of sequence impedance, fault analysis, finding of subtransient reactanc e‘s.
- To draw the equivalent circuit of three winding transformer by conducting a suitable experiment.
- To develop the MATLAB program for formation of Y and Z buses. To develop the MATLAB programs for Gauss-Seidel and fast decoupled load flow studies.
- To develop the SIMULINK model for single area load frequency problem.

Course Outcomes:

CO1: Analyze and determine the sequence impedances of both cylindrical rotor and salient pole synchr machines to understand their behavior under various fault conditions. -**L3**

CO2: Conduct fault analysis (LG, LL, LLG, and LLLG) on synchronous machines and interpret the im faults on system stability and performance. **-L2**

CO3: Develop and simulate load flow analysis using various methods (Gauss-Seidel, Newton-Raphson, Decoupled) and formulate the YBus and ZBus for power system networks. **-L5**

CO4: Model load frequency control problems for single and two-area systems, employing both uncontr PI-controlled approaches to evaluate system performance**.- L4**

CO5: Simulate load frequency control problems for single and two-area systems, employing both unco PI-controlled approaches to evaluate system performance**.-L6**

CHOOSE ANY TEN FROM THE FOLLOWING LIST:

1. Determination of Sequence Impedances of Cylindrical Rotor Synchronous Machine
2. Determination of Sequence Impedances of salient pole Synchronous Machine
3. LG Fault Analysis on an un loaded alternator
4. LL Fault Analysis on conventional phases
5. LLG Fault Analysis
6. LLLG Fault Analysis
7. Determination of Sub transient reactance of salient pole synchronous machine
8. Equivalent circuit of three winding transformer.
9. Y_{Bus} formation using Advanced Soft Tools
10. ZBus formation using Soft Tools
11. Gauss-Seidel load flow analysis using Soft Tools
12. Newton-Raphson load flow analysis using Soft Tools
13. Fast decoupled load flow analysis using Soft Tools
14. Solve the Swing equation and Plot the swing curve
15. Develop a model for a uncontrolled single area load frequency control problem and simulate the same using Soft Tools.
16. Develop a model for PI controlled single area load frequency control problem and simulate the same using Soft Tools.
17. Develop a model for a uncontrolled two area load frequency control problem and simulate the same using Soft Tools.
18. Develop a model for PI controlled two area load frequency control problem and simulate the same using Soft Tools.

Online Learning Resource:

1. https://www.ee.iitb.ac.in/~vlabsync/template/vlab/index.html#

IV Year B.Tech. EEE – I Semester

23BST39	GENDER SENSITIZATION (Common to All Branches of Engineering)	L	T	P	C
		0	0	2	0

Course Objectives:

- To enable students to understand the gender related issues, vulnerability of women and men
- To familiarize them about constitutional safeguard for gender equality
- To expose the students to debates on the politics and economics of work
- To help students reflect critically on gender violence
- To make them understand that gender identities and gender relations are part of culture as shape the way daily life is lived in the family as well as wider community and the workpla

Course Outcomes (CO):

COs	Statements	Blooms level
CO1	Understand the basic concepts of gender and its related terminology.	L1, L2
CO2	Identify the biological, sociological, psychological and legal aspects of gender.	L1, L2
CO3	Use the knowledge in understanding how gender discrimination works in our society and how to counter it.	L3
CO4	Analyze the gendered division of labour and its relation to politics and economics.	L4
CO5	Appraise how gender-role beliefs and sharing behaviour are associated with more well-being in all cultures and gender groups.	L5
CO6	Develop students' sensibility with regard to issues of gender in contemporary India.	L3

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 f 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

Prescribed 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:

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-andstereotypes

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-beredressed

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/