GEETHANJALI INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
NELLORE–524137(A.P) INDIA

B.TECH Electrical and Electronics Engineering
Course Structure (RG22)

Semester-6 (Theory-5,Lab-3, SC -1, MC-1)							
Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	HSC	22A0022T	Managerial Economics and Financial Analysis	3	0	0	3
2	PCC	22A0228T	Power System Analysis	3	0	0	3
3	PCC	22A0427T	Digital Computing Platforms	3	0	0	3
4	PEC		**Professional Elective-II**:	3	0	0	3
5	OEC		**Open Elective-II** :	3	0	0	3
6	PCC (Lab)	22A0232P	Power System & Simulation Lab	0	0	3	1.5
7	PCC (Lab)	22A0428P	Digital Computing Platforms Lab	0	0	3	1.5
8	PCC (Lab)	22A0029P	Soft skills	0	0	3	1.5
8	SC	22A0511	**Skill Advanced Course:** Basic Web Design	1	0	2	2
9	MC	22A0031T	**Mandatory Course:** Design Thinking and Innovation	2	0	0	0
Total credits							**21.5**
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)				4	0	0	4
Industrial/ Research Internship (Mandatory) 2months during summer vacation (22A0243P)							

Professional Elective:

Sl. No.	Category	Course Code	Course Title
1	**Professional Elective-II:**	22A0229T 22A0230T 22A0231T	1. Fundamentals of HVDC & FACTS 2. Reactive power management &control 3. Neutral Networks & Fuzzy Logic

Open Elective Course – II

S.No	Course Code	Course Name	Offered by the Dept.
1	22A0150T	Environmental Economics	CE
2	22A0431T	Microcontrollers & Applications	ECE
3	22A0528T	Machine Learning	CSE
4	22A0327Tb	Introduction to Composites	ME
5	22A0331Tc	Introduction to Robotics	

Category	Credits
Professional Core Courses(PCC)	10.5
Humanities and Social Science Course (HSC)	3
Professional Elective Courses(PEC)	3
Open Elective Courses (OEC)	3
Skill Oriented Course (SC)	2
Total	**21.5**

BOS Chairman **Dean of Academics** **Principal**

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS					
Course Code	**L:T:P**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
22A0022T	**3:0:0**	**3**	**CIE:30& SEE:70**	**3 Hours**	**HSC**

Course Objectives:

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

- To understand the concepts of managerial economics and financial analysis this helps in optimal decision making in business environment.
- To have a thorough knowledge on the production theories and cost while dealing with the production and factors of production.
- To have a thorough knowledge regarding market structure and forms of business organizations in the market.
- To understand the concept of capital and capital budgeting in selecting the proposals.
- To have a thorough knowledge on recording, classifying and summarizing of transactions in preparing of final accounts.

Syllabus		**Total Hours: 48**
Unit-I	**INTRODUCTION TO MANAGERIAL ECONOMICS &DEMAND**	**9Hrs**

Managerial Economics – Definition – Nature & Scope - Contemporary importance of Managerial Economics - Demand Analysis - Concept of Demand - Demand Function - Law of Demand - Elasticity of Demand - Significance - Types of Elasticity - Measurement of Elasticity of Demand - Demand Forecasting - Factors governing Demand Forecasting - Methods of Demand Forecasting - Relationship of Managerial Economics with Financial Accounting and Management

Unit-II	**THEORY OF PRODUCTION AND COST ANALYSIS**	**9Hrs**

Production Function – Least-cost combination - Short-run and Long-run Production Function - Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale - Cost concepts and Cost behavior - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems) - Managerial significance and limitations of Break-Even Analysis.

Unit -III	**INTRODUCTION TO MARKETS ANDFORMS OF BUSINESS ORGANIZTIONS**	**10Hrs**

Market structures - Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition – Monopoly - Monopolistic Competition – Oligopoly - Price-Output Determination - Pricing Methods and Strategies - Forms of Business Organizations - Sole Proprietorship - Partnership - Joint Stock Companies - Public Sector Enterprises-.

Unit -IV	**CAPITAL AND CAPITAL BUDGETING**	**10Hrs**

Concept of Capital - Significance - Types of Capital - Components of Working Capital Sources of Short-term and Long-term Capital - Estimating Working capital requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Unit -V	**INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS**	**10Hrs**

Accounting Concepts and Conventions - Introduction Double-Entry Book Keeping, Journal, Ledger, and Trial Balance - Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Course Outcomes(CO):

At the end of studying the course, the student should be able to:

- Outline the Managerial Economic concepts for decision making and forward planning. Also know law of demand and its exceptions, to use different forecasting methods for predicting demand for various products and services. (L2)
- Assess the functional relationship between Production and factors of production and list out various costs associated with production and able to compute breakeven point to illustrate the various uses of breakeven analysis. (L5)
- Outline the different types of business organizations and provide a framework for analyzing money in its functions as a medium of exchange. (L2)
- Interpret various techniques for assessing the proposals of project for financial position of the business. (L2)
- Identify the principles of accounting to record, classify and summarize various transactions in books of accounts for preparation of final accounts. (L3)

Textbooks:

1. Managerial Economics, PL Mehata, Sulthan Chand Publications

Reference Books:

1. Ahuja Hl "Managerial economics" 3 rd edition, Schand, ,2013
2. S.A. Siddiqui and A.S. Siddiqui: "Managerial Economics and Financial Analysis", New Age International,. 2013.
3. Joseph G. Nellis and David Parker: "Principles of Business Economics", 2nd edition, Pearson, New Delhi.
4. Domnick Salvatore: "Managerial Economics in a Global Economy", Cengage, 2013.
5. Managerial Economics, Varshney &Maheswari, Sultan Chand, 2013.
6. Managerial Economics and Financial Analysis, Aryasri, 4th edition, MGH, 2019

POWER SYSTEM ANALYSIS					
Course Code	**L:T:P**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
22A0228T	**3:0:0**	**3**	**CIE:30 &SEE:70**	**3 Hours**	**PCC**

Course Objectives:

The objectives of the course are to make the students learn about:
The use of per unit values and graph theory concepts, solving a problem using computer.

- Formation of Ybus and Zbus of a Power System network, power flow studies by various methods.
- Different types of faults and power system analysis for symmetrical and also unsymmetrical faults.
- Analysis of power system for steady state and transient stability and also methods to improve stability

Syllabus		**Total Hours:48**
Unit-I	**PER-UNIT SYSTEM AND Y bus FORMATION**	**10Hrs**

Per-Unit representation of Power system elements - Per-Unit equivalent reactance network of a three phase Power System - Graph Theory: Definitions, Bus Incidence Matrix, YBus formation by Direct and Singular Transformation Methods, Numerical Problems..

Unit-II	**FORMATION OF Z bus**	**10Hrs**

Formation of Z Bus: Partial network, Algorithm for the Modification of Z Bus Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses - Modification of Z Bus for the changes in network

Unit -III	**POWER FLOW ANALYSIS**	**8Hrs**

Static load flow equations – Load flow solutions using Gauss Seidel Method: Algorithm and Flowchart. Acceleration Factor, Load flow Solution for Simple Power Systems (Max. 3-Buses):Newton Raphson Method in Polar Co-Ordinates Form: Load Flow Solution- Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods.- Comparison of Different Methods

Unit -IV	**SHORT CIRCUIT ANALYSIS**	**10Hrs**

Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors. Symmetrical Component Theory: Positive, Negative and Zero sequence components, Positive, Negative and Zero sequence Networks. Symmetrical Fault Analysis: LLLG faults with and without fault impedance, Unsymmetrical Fault Analysis: LG, LL and LLG faults with and without fault impedance, Numerical Problems.

Unit -V	**STABILITY ANALYSIS**	**10Hrs**

Elementary concepts of Steady State, Dynamic and Transient Stabilities. Derivation of Swing Equation, Power Angle Curve and Determination of Steady State Stability. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation. Numerical methods for solution of swing equation

Course Outcomes(CO):

At the end of studying the course, the student should be able to:

- Develop Ybus , Zbus matrices for the power system networks
- Perform the load flow analysis of power system networks using Gauss-Seidel, Newton-Raphson methods.
- Analyze symmetrical and unsymmetrical faults in power system networks.
- Estimate the Transient and steady state Stability for single machine infinite system.
- Apply mathematical techniques/methods to solve economic load dispatch problems.
- Model and analyze the single and two area Load frequency control systems for the control of frequency.

Textbooks:

1. I. J. Nagrath & D. P. Kothari Modern Power System Analysis, 4th Edition, Tata McGraw-Hill Publishing Company, 2011.
2. Dr. K.Uma Rao, Computer Techniques and Models in Power Systems,2nd Revised Edition, I.K .InterNat, 2014
3. Dr. K.Uma Rao, Power System - Operation and Control, Wiley IndiaPvt. Ltd., 2012.

Reference Books:

1. Glenn W.Stagg, Ahmed H. El-Abiad, Computer Methods in PowerSystem Analysis, McGraw-Hill Publishing Company
2. Olle. I. Elgerd, Electric Energy Systems Theory – An Introduction,30th Reprint, Tata McGraw Hill Publishing Company Ltd, New Delhi,2007.
3. C.L.Wadhwa, Electrical Power Systems,7th Edition, New Age International (P) Limited Publishers, 2016.
Electrical & Electronics Engineering150

Online Learning Resources:

- **https://onlinecourses.nptel.ac.in/noc21_ee13/preview**

DIGITAL COMPUTING PLATFORMS

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
22A0427T	3:0:0	3	CIE:30 &SEE:70	3 Hours	PCC

Course Objectives:

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

- Architecture and designing of 8086 Microprocessor with Assembling language programming and interfacing with various modules
- Understand the Interfacing of 8086 with various advanced communication devices
- Designing of 8051 Microcontroller with Assembling language programming and interfacing with various modules
- To know about Assembly Language Programs for the Digital Signal Processors and usage of Interrupts
- To understand Xilinx programming and understanding of Spartan FPGA board

Syllabus — **Total Hours: 48**

Unit-I	INTRODUCTION TO MICROPROCESSORS	10Hrs

Historical background- Evolution of microprocessors up to 64-bit. Architecture of 8086 microprocessor, special function of general-purpose registers. 8086 flag registers and functions of 8086 flags – Addressing modes of 8086 – Instruction set of 8086 – Assembler directives - Pin diagram 8086 – Minimum mode and maximum mode of operation - Timing diagrams - CISC and ARM Processors

Unit-II	ASSEMBLY LANGUAGE PROGRAMMING & I/O INTERFACE	10Hrs

Assembler directives – macros – simple programs involving logical – branch instructions – sorting – evaluating arithmetic expressions - string manipulations – 8255 PPI - various modes of operation - A/D - D/A converter interfacing, Memory interfacing to 8086 – interrupt structure of 8086 – vector interrupt table – interrupt service routine – interfacing interrupt controller 8259 - Need of DMA – serial communication standards – serial data transfer schemes

Unit -III	8051 MICRO CONTROLLER PROGRAMMING AND APPLICATIONS	8Hrs

Introduction to micro controllers, Functional block diagram, Instruction sets and addressing modes, interrupt structure – Timer – I/O ports – serial communication. Data transfer, manipulation, Control and I/O instructions – simple programming exercises key board and display interface – Closed loop control of servo motor – stepper motor control

Unit -IV	INTRODUCTION TO TMS320LF2407 DSP CONTROLLER	10Hrs

Basic architectural features - Physical Memory - Software Tools. Introduction to Interrupts - Interrupt Hierarchy - Interrupt Control Registers. C2xx DSP CPU and Instruction Set: Introduction & code Generation - Components of the C2xx DSP core - Mapping External Devices to the C2xx core - peripheral interface - system configuration registers - Memory - Memory Addressing Modes - Assembly Programming Using the C2xx DSP Instruction set.

Unit -V	FIELD PROGRAMMABLE GATE ARRAYS (FPGA)	10Hrs

Introduction to Field Programmable Gate Arrays – CPLD Vs FPGA – Types of FPGA – Xilinx, XC3000 series - Configurable logic Blocks (CLB) – Input / Output Block (IOB) – Programmable Interconnect Point (PIP) – Xilinx 4000 series – HDL programming –overview of Spartan 3E and Virtex II pro FPGA boards- case study.

Course Outcomes(CO):

At the end of studying the course, the student should be able to:

- Understand the basic architecture & pin diagram of 8086 microprocessor
- Understand the basic architecture of 8051 Microcontroller, DSP Processor and FPGA Processors
- Apply the concepts to design Assembly language programming to perform a given task, Interrupt service routines for all interrupt types
- Design Real time applications by writing Assembly Language Programs for the Digital Signal

Processors.

- Design Real time applications by Xilinx programming for Spartan FPGA boards and use Interrupts for real-time control applications
- Analyze various real time systems by using various controllers

Textbooks:

1. . Ramesh S. Gaonkar, DI Architecture Programming and Applications with8085, Penram Intl. Publishing, 6th Edition, 2013 .
2. Ray A. K., Bhurchandi K. M., Advanced Microprocessor and Peripherals, Tata McGraw- Hill Publications, 3rd Edition, 2013..

Reference Books:

- Microprocessor and Interfacing by Douglas V Hall, 2nd Edition, Tata McGraw hill, 1992
- Application Notes from the webpage of Texas Instruments.
- XC 3000 series datasheets (version 3.1). Xilinx Inc., USA, 1998
- XC 4000 series datasheets (version 1.6). Xilinx Inc., USA, 1999
- Wayne Wolf, FPGA based system design, Prentice hall, 2004.

Online Learning Resources:

1. https://nptel.ac.in/courses/106108100
2. https://nptel.ac.in/courses/108105102
3. https://nptel.ac.in/courses/117108040

FUNDAMENTALS OF HVDC & FACTS
Professional Elective-II

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
22A0229T	3:0:0	3	CIE:30& SEE:70	3 Hours	PEC

Course Objectives:

Student will be able to

- Understand To get through knowledge on Basics of HVDC system.
- Understand the concepts of converters control schemes
- Get an idea on Harmonics and filters
- Understand reactive power control and power flow analysis in HVDC system
- Understand basic concepts of FACTS, necessity of FACTS controllers and their operation.
- Understand shunt and series compensation through various static compensators.

Syllabus — **Total Hours: 48**

Unit-I	INTRODUCTION TO HVDC	10 Hrs

Comparison of AC and DC transmission systems, application of DC transmission, types of DC links, typical layout of a HVDC converter station, HVDC converts, pulse number, analysis of Gratez circuit with and without overlap, converter bridge characteristics, equivalent circuits or rectifier and inverter configurations of twelve pulse converters

Unit-II	CONVERTER & HVDC SYSTEM CONTROL	10 Hrs

Principal of DC link control –Converters control characteristics- system control hierarchy, firing angle control, current and excitation angle control, starting and stopping of DC link.

Unit–III	HARMONICS, FILTERS AND REACTIVE POWER CONTROL	8Hrs

Introduction, generation of Harmonics, AC and DC Filters. Reactive power requirements in steady state, sources of reactive power, static VAR systems.

POWER FLOW ANALYSIS IN AC/DC SYSTEMS: Modeling of DC/AC converts, controller equations solutions of AC/DC load flow- simultaneous method, sequential method.

Unit -IV	INTRODUCTION TO FACTS	10Hrs

Flow of power in AC parallel pathsand meshed systems, basic types of FACTS controllers, brief description and definitions of FACTS controllers. STATIC SHUNT COMPENSATION: Objectives of shunt compensation, methods of controllable VAR generation, static VAR compensators, SVC and STATCOM, comparison between SVC and STATCOM.

Learning Outcomes:

At the end of this unit, the student will be able

1.Describe the switching technique facts controllers

2. Explain the principle of different VAR compensators

Unit–V	STATIC SERIES COMPENSATORS	10 Hrs

Objectives of series compensation, variable impedance type- thyristor switched series capacitors (TCSC), and switching converter type series compensators, static series synchronous compensator (SSSC)- power angle characteristics-basic operating control schemes. COMBINED COMPENSATORS: Introduction, unified power flow controller (UPFC), basic operating principle, independent real and reactive power flow controller, control structure.

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the concept of AC and DC Transmission Systems and an overview of HVDC Converters
- Apply converters for HVDC transmission and also about control of converters
- Understand the concept of filters to mitigate harmonics, concept of reactive power requirements.
- Understand the concept of power flow in AC /DC Transmission systems
- Understand the concept of FACTS and operation of shunt FACTS controllers

Analyze the operation of series FACTS controllers and concept of series-shunt type FACTS controller

Textbooks:

1HVDC Power Transmission Systems: Technology and System Interactions, K.R.Padiyar, New Age International (P) Limited.

2. Understanding FACTS, Concepts and Technology of Flexible AC Transmission Systems, Narain. G. Hingorani,

Laszlo Gyugyi, IEEE Press, Wiley India.

Reference Books:

1. HVDC and Facts Controllers Applications of static converters in power systems, Vijay K.Sood, Kluwer Academic Publishers.
2. HVDC Transmission, S.Kamakshaiah, V.Kamaraju, The Mc- Graw Hill Companies .
3. Thyristor- Based Controllers for Electrical Transmission Systems, R.Mohan Mathur, Rajiv K.Varma.Wiley India.
4. Facts controllers in power transmission and distribution, K.R.Padiyar, New Age International (P) Limited.

Web References:

Lecture Series on Power Electronics by Prof. B.G. Fernandes, Department of Electrical Engineering, IIT Bombay. https://nptel.ac.in/courses/108/101/108101038/

REACTIVE POWER MANAGEMENT & CONTROL
Professional Elective-II

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
22A0230T	3:0:0	3	CIE:30& SEE:70	3 Hours	PEC

Course Objectives:

Student will be able to

- To learn about voltage disturbances and power transients that is occurring in power systems.
- To know about voltage sag and transient over voltages for quality of power supply
- To understand about harmonics and their mitigation
- To study about different power quality measuring and monitoring concepts.
- To know about long duration voltage variations.

Syllabus		Total Hours: 48
Unit-I	**POWER QUALITY ISSUES**	**10Hrs**

Power quality, voltage quality, The power quality Evaluation procedure, Terms and Definitions, Transients, Long-duration voltage variations, short-duration voltage variations, voltage imbalance, wave form distortion, voltage fluctuation, power frequency variations, power quality terms CBEMA and ITI curves.

Unit-II	VOLTAGE SAGS AND TRANSIENT OVER VOLTAGES	9Hrs

Sources of sags and interruptions, Estimating voltage sag performance, fundamental principles of protection, solutions at the end-use level, Motor-starting sags and utility system fault-clearing issues, sources of over voltages, principles of over voltage protection, devices for over voltage protection, utility capacitor-switching transients, utility system lightning protection. .

Unit–III	FUNDAMENTALS OF HARMONICS	10Hrs

Harmonic sources from commercial and industrial loads, locating harmonic sources, Power system response characteristics, Harmonics Vs transients, Effect of harmonics, harmonic distortion, voltage and current distortion, harmonic indices, inter harmonics, resonance, harmonic distortion evaluation, devices for controlling harmonic distortion, passive and active filters, IEEE and IEC Standards.

Unit -IV	LONG-DURATION VOLTAGE VARIATIONS	10Hrs

Principles of regulating the voltage, Devices for voltage regulation, utility voltage regulator Application, capacitors for voltage regulation, End user capacitor applications, flicker.

Unit–V	POWER QUALITY BENCH MARKING AND MONITORING	9Hrs

Benchmarking process, RMS Voltage variation Indices, Harmonic indices Power Quality Contracts, Monitoring considerations, power quality measurement equipment, Power quality Monitoring standards.

Course Outcomes(CO):

On completion of this course, student will be able to

- Know the severity of power quality problems in distribution system.
- Analyze voltage disturbances and power transients that are occurring in power systems.
- Understand the concept of voltage sag transformation from up-stream (higher voltages)
- Understand the concept of harmonics in the system and their effect on different power system equipment.
- Understand the principles of regulation of long duration voltage variations
- To get knowledge about different power quality measuring and monitoring concepts.
- Compute the concept of improving the power quality to sensitive load by various mitigating custom power devices

Textbooks:

1. Roger C. Dugan, Mark F.Mc Granaghan, Surya Santoso, H.Wayne Beaty, “Electrical Power Systems Quality” 2 nd Edition, TMH Education Pvt. Ltd, 2012
2. C. Sankaran, “Power quality”, CRC Press, 2017

Reference Books:

1. J. Arrillaga, N.R. Watson, S. Chen, “Electrical systems quality Assessment”, John Wiley & Sons, 2000.
2. Math H. J. Bollen, “Understanding Power quality problems”, Wiley-IEEE Press, 2000

Online Learning Resources:

https://archive.nptel.ac.in/courses/108/102/108102179/
https://www.youtube.com/watch?v=19eIVIVBrfE&t=1s

NEURAL NETWORKS AND FUZZY LOGIC
Professional Elective-II

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
22A0231T	3:0:0	3	CIE:30& SEE:70	3 Hours	PEC

Course Objectives:

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

- This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.
- It deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components.
- The Neural Network and Fuzzy Network system application to Electrical Engineering is also presented. This subject is very important and useful for doing Project Work.
- The main objective of this course is to provide the student with the basic understanding of neural networks and fuzzy logic fundamentals.

Syllabus		Total Hours: 48Hrs
Unit-I	**INTRODUCTION TO NEURAL NETWORKS**	**10Hrs**

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

Unit-II	ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS	8Hrs

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

Unit -III	SINGLE LAYER AND MULTI LAYER FEED FORWARD NEURAL NETWORKS	10Hrs

Introduction, Perceptron Models, Training Algorithm, Limitations of the Perceptron Model, Applications, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm.

Unit -IV	CLASSICAL & FUZZY SETS	10Hrs

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

Unit -V	FUZZY LOGIC SYSTEM COMPONENTS	10Hrs

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

Course Outcomes(CO):

At the end of studying the course, the student should be able to:

- Knowledge and understanding: Understanding principles of neural networks and fuzzy Logic fundamentals.
- Design the required and related systems
- After going through this course student will get thorough knowledge in biological neuron and artificial neurons.
- Students will be able to compare analysis between human and computer, Artificial Neural Networks models, characteristics of ANN's learning strategies, learning rules and basics of fuzzy logic.
- Students will be able to understand concept of classical and fuzzy sets
- Students will be able to understand fuzzification and defuzzification, with which they can be able to apply the conceptual things to the real world electrical and electronics problems and applications.

Textbooks:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.
2. Introduction to Neural Networks using MATLAB 6.0 - S.N.Sivanandam, S.Sumathi, S.N.Deepa, TMH, 2006

ReferenceBooks:

1. Neural Networks – James A Freeman and Davis Skapura, Pearson Education, 2002.
2. Neural Networks – Simon Hakins , Pearson Education
3. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
4. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.

ENVIRONMENTAL ECONOMICS
(Common to ME, CSE,AI&ML, CS, DS, ECE,EEE)
(Open Elective Course-II)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
22A0150T	3:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

- To impart knowledge on sustainable development and economics of energy
- To teach regarding environmental degradation and economic analysis of degradation
- To inculcate the knowledge of economics of pollution and their management
- To demonstrate the understanding of cost benefit analysis of environmental resources
- To make the students to understand principles of economics of biodiversity

Syllabus		**Total Hours:48**
Unit-I	**Sustainable Development**	**9 Hrs**

Introduction to sustainable development - Economy-Environment inter linkages - Meaning of sustainable development - Limits to growth and the environmental Kuznets curve – The sustainability debate - Issues of energy and the economics of energy

Unit-II	**Environmental Degradation**	**9 Hrs**

Economic significance and causes of environmental degradation - The concepts of policy failure, externality and market failure - Economic analysis of environmental degradation – Equi –marginal principle.

Unit -III	**Economics of Pollution**	**10 Hrs**

Economics of optimal pollution, regulation, monitoring and enforcement - Managing pollution using existing markets: Bargaining solutions – Managing pollution through market intervention: Taxes,subsidies and permits.

Unit -IV	**Cost – Benefit Analysis**	**10 Hrs**

Cost – Benefit Analysis: Economic value of environmental resources and environmental damage - Concept of Total Economic Value - Alternative approaches to valuation – Cost-benefit analysis and discounting.

Unit -V	**Economics Of Biodiversity**	**10 Hrs**

Economics of biodiversity: Economics of biodiversity conservation - Valuing individual species anddiversity of species -Policy responses at national and international levels. Economics of Climate Change – stern Report

Textbooks:

1. An Introduction to Environmental Economics by N. Hanley, J. Shogren and B. White Oxford University Press.(2001)
2. Blueprint for a Green Economy by D.W. Pearce, A. Markandya and E.B. Barbier Earthscan, London.(1989)

Reference Books:

1. Environmental Economics: An Elementary Introduction by R.K. Turner, D.W. Pearce and I.Bateman Harvester Wheatsheaft, London. (1994),
2. Economics of Natural Resources and the Environment by D.W. Pearce and R.K. Turner HarvesterWheat sheaf, London. (1990),

E-resources:

1. https://nptel.ac.in/courses/109107171

Course Outcomes(CO):

On completion of this course, student will be able to

CO1: Understand the information on sustainable development and economics of energy

CO2: Understand the information regarding environmental degradation

CO3: Understand the information regarding economic analysis of degradation**CO4:** The identification of economics of pollution and their management **CO5:** The cost benefit analysis of environmental resources.

CO6: The principles of economics of biodiversity

MICROCONTROLLERS & APPLICATIONS
Common to (EEE,CSE, AI&ML, CS, DS)
(Open Elective Course-II)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
22A0431T	3:0:0	3	CIE:30& SEE:70	3 Hours	OEC

Course Objectives:

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

- Describe the Architecture of 8051 Microcontroller and Interfacing of 8051 to external memory.
- Write 8051 Assembly level programs using 8051 instruction set.
- Describe the Interrupt system, operation of Timers/Counters and Serial port of 8051.
- Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051..

Syllabus — **Total Hours: 48Hrs**

Unit-I — **10Hrs**

8051 Microcontroller: Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture- Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing.

Unit-II — **8Hrs**

Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Bit manipulation instructions. Simple Assembly language program examples to use these instructions

Unit -III — **10Hrs**

8051 Stack, Stack and Subroutine instructions: Simple Assembly language program examples to use subroutine instructions.8051 Timers and Counters – Operation and Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode- 2 on a port pin.

Unit -IV — **10Hrs**

8051 Serial Communication- Basics of Serial Data Communication, RS- 232 standard, 9 pin RS232 signals, Simple Serial Port programming in Assembly and C to transmit a message and to receive data serially.8051 Interrupts. 8051 Assembly language programming to generate an external interrupt using a switch.

Unit -V — **10Hrs**

8051 C programming to generate a square waveform on a port pin using a Timer interrupt. Interfacing 8051 to ADC-0804, DAC, LCD and Interfacing with relays and Opto isolators, Stepper Motor Interfacing, DC motor interfacing, PWM generation using 8051.

Course Outcomes(CO):

At the end of studying the course, the student should be able to:

- Understand the importance of Microcontroller
- Acquire the knowledge of Architecture of 8051 Microcontroller.
- Apply and Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to using 8051 I/O ports.
- Develop the 8051 Assembly level programs using 8051 instruction set.
- Design the Interrupt system
- Understand the operation of Timers/Counters and Serial port of 8051

Textbooks:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; "The 8051 Microcontroller and Embedded Systems – using assembly and C", PHI, 2006 / Pearson, 2006. 2. Kenneth J. Ayala, "The 8051 Microcontroller", 3rd Edition, Thomson/Cengage Learning

ReferenceBooks:

1. Manish K Patel, "The 8051 Microcontroller Based Embedded Systems", McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. Raj Kamal, "Microcontrollers: Architecture, Programming, Interfacing and System Design", Pearson Education, 2005. Wayne Wolf, FPGA based system design, Prentice hall, 2004.

MACHINE LEARNING (Common to CE,EEE,ME and ECE)
(Open Elective Course-II)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
22A0528T	3:0:0	3	CIE: 30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students to:

- Understand basic concepts of Machine Learning
- Study different learning algorithms
- Illustrate evaluation of learning algorithms

Syllabus		Total Hours:48
Unit -I	**Introduction – Human Learning & Machine Learning**	**10Hrs**

Human Learning, Types of Human Learning, Machine Learning, Types of Machine Learning,Applications of Machine Learning, Issues in Machine Learning.

Basic types of Data in Machine Learning, Data Preprocessing : Data Cleaning, Data transformationand Data Reduction

Unit -II	**Modeling and Evaluation**	**9Hrs**

Introduction, selecting a Model, training a Model, Model Representation and Interpretability,Evaluating Performance of a Model, Improving Performance of a Model

Unit -III	**Supervised Learning :Classification**	**10Hrs**

Classification – Methods of Classification : Classification model, Classification Learning Steps, Classification by Decision tree Induction, Classification by Back propagation, K-Nearest Neighbor Classification, Random Forest Algorithm, Naïve Baye's Classification

Unit -IV	**Supervised Learning : Regression**	**10Hrs**

Regression – Assumptions in Regression Analysis, Types of Regression: Simple Linear Regression, Multiple Linear Regression, Polynomial Regression, Logistic Regression, Curve Fitting- Method ofLeast Squares.

Unit -V	**Unsupervised Learning : Clustering**	**9Hrs**

Clustering- Different types of clustering techniques, Partitioning Methods: K-Means Algorithm, K- Medoid's algorithm, Hierarchical Clustering Methods, Density based Clustering Methods- DBSCAN, DENCLUE, OPTICS

Text Books:

1. Machine Learning, SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019.

Reference Books:

1. EthernAlpaydin, "Introduction to Machine Learning", MIT Press, 2004.
2. Stephen Marsland, "Machine Learning -An Algorithmic Perspective", Second Edition, Chapmanand Hall/CRC Machine Learning and Pattern Recognition Series,2014.
3. Andreas C. Müller and Sarah Guido "Introduction to Machine Learning with Python: A Guide forData Scientists", Oreilly.

Web Resources:

1. Andrew Ng, “Machine Learning Yearning”
2. https://www.deeplearning.ai/machine-learning-
3. https://www.cse.huji.ac.il/~shais/Understanding MachineLearning/index.html

Course Outcomes (CO):

On completion of this course, student will be able to:

CO1: Identify machine learning techniques suitable for a given problem

CO2: Characterize the machine learning algorithms as supervised learning and unsupervised learning

CO3: Solve the problems using various machine learning techniques

CO4: Design application using machine learning techniques

CO5: Analyze and Apply the suitable supervised learning methods for real-world problems

CO6: Understand the features of machine learning to apply on real world problems

Introduction to Composites
(Open Elective Course-II)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
22A0327Tb	3:0:0	3	CIE:30& SEE:70	3 Hours	OEC

Course Objectives:

1. To be familiar with classification and characteristics of composite material and their applications.
2. To gain the knowledge about manufacturing methods of composites.
3. To know the testing methods related to composite materials.

Syllabus — **Total Hours:50**

UNIT - I	**Introduction**	**10 Hrs**

Definitions, Composites, Reinforcements and matrices, Types of reinforcements, Types of matrices, Types of composites, Carbon Fibre composites, Properties of composites in comparison with standard materials, Applications of metal, ceramic and polymer matrix composites.

UNIT - II	**Manufacturing methods**	**10 Hrs**

Hand and spray lay - up, injection molding, resin injection, filament winding, pultrusion, centrifugal casting and prepregs. Fibre/Matrix Interface, mechanical. Measurement of interface strength.

UNIT - III	**Mechanical Properties**	**10 Hrs**

Stiffness and Strength: Geometrical aspects – volume and weight fraction. Unidirectional continuous fibre, discontinuous fibers, Short fiber systems, woven reinforcements –Mechanical Testing: Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear.

UNIT - IV	**Laminates**	**10 Hrs**

Plate Stiffness and Compliance, Assumptions, Strains, Stress Resultants, Plate Stiffness and Compliance, Computation of Stresses, Types of Laminates -, Symmetric Laminates, Anti-symmetric Laminate, Balanced Laminate, Quasi-isotropic Laminates, Crossply Laminate, Angle-ply Laminate. Orthotropic Laminate, Laminate Moduli, Hygrothermal Stresses.

UNIT - V	**Joining Methods and Failure Theories**	**10 Hrs**

Joining –Advantages and disadvantages of adhesive and mechanically fastened joints. Typical bond strengths and test procedures.

Course Outcomes(CO):

To provide knowledge on characteristics of composites

1. To get knowledge on manufacturing and testing methods and mechanical behaviour of composites.
2. To get the exposure of different materials

Textbooks:

1. K.K. Chawla, (1998), Composite Materials, Springer-Verlag, New York 2. B.T. Astrom, (1997),
2. Manufacturing of Polymer Composites, Chapman & Hall
3. Composite materials by J.N.Reddy

Reference Books:

1. Stuart M Lee, J. Ian Gray, Miltz, (1989), Reference Book for Composites Technology, CRC press
2. Frank L Matthews and R D Rawlings, (2006), Composite Materials: Engineering and Science, Taylor and Francis.
3. D. Hull and T.W. Clyne, (1996), Introduction to Composite Materials, Cambridge University Press
4. Analysis and Performance of Fiber Composites by Bhagwan D. Agarwal
5. Mechanics of Composite Materials by Autar K. Kaw

Introduction to Robotics
(Open Elective Course-II)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
22A0331Tc	3:0:0	3	CIE:30& SEE:70	3 Hours	OEC

Course Objectives:

The objectives of this course are Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.

Syllabus — **Total Hours:52**

UNIT - I	ROBOT BASICS	12 Hrs

Automation and Robotics : Robot-Basic concepts, Need, Law, History, Anatomy, specifications. Robot configurations-cartesian, cylinder, polar and articulate. Robot wrist mechanism, Precision, accuracy, repeatability, work and volume of robot.

UNIT - II	ROBOT ELEMENTS	10 Hrs

End effectors-Classification- Types of Mechanical actuation, Gripper design, Robot drive system Types, Position and velocity feedback devices-Robot joints and links-Types, Motion interpolation

UNIT - III	ROBOT KINEMATICS AND CONTROL	10 Hrs

Robot kinematics – Basics of direct and inverse kinematics, Robot trajectories, 2D and 3D Transformation-Scaling, Rotation, Translation Homogeneous transformation. Control of robot manipulators – Point to point, Continuous Path Control, Robot programming

UNIT - IV	ROBOT SENSORS	10 Hrs

Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors. Force sensor-Light sensors, Pressure sensors, Introduction to Machine Vision and Artificial Intelligence.

UNIT - V	ROBOT APPLICATIONS	10 Hrs

Industrial applications of robots-Medical, Household, Entertainment, Space, Underwater, Defense, Disaster management. Applications, Micro and Nanorobots, Future Applications.

Course Out comes (CO):

On completion of the course the student will be able to:

1. list and explain the basic elements of industrial robots
2. analyse robot kinematics and its control methods.
3. classifythe various sensors used in robots for better performance.
4. summarize various industrial and non-industrial applications of robots

Textbooks:

1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel, Nicholas G Odrey, “Industrial Robotics Technology,
2. Programming and Applications”, Tata –McGraw Hill Pub. Co., 2008.
3. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2010.

Reference Books:

1. Klafter.R.D, Chmielewski.T.A, and Noggin’s., “Robot Engineering: An Integrated Approach”’, Prentice Hall of India Pvt. Ltd., 1994.
2. Fu.K.S, Gonzalez.R.C&Lee.C.S.G, “Robotics control, sensing, vision and intelligence”, Tata- McGraw Hill Pub. Co., 2008
3. Yu. “Industrial Robotics”, MIR Publishers Moscow, 1985

POWER SYSTEMS & SIMULATION LABORATORY					
Course Code	**L:T:P**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
22A0232P	**0:0:3**	**1.5**	**CIE:30& SEE:70**	**3 Hours**	**PCC**

Course Objectives:

Student will be able to

1. Experimental determination (in machines lab) of sequence impedance and sub trasient reactance's of synchronous machine
2. Conducting experiments to analyze LG, LL, LLG, LLLG faults
3. The equivalent circuit of three winding transformer by conducting a suitable experiment.
4. Developing MATLAB program for formation of Y and Z buses.
5. Developing MATLAB programs for gauss-seidel and fast decoupled load flow studies.
6. Developing the SIMULINK model for single area load frequency control problem.

List of Experiments:

1. Determination of Sequence Impedances of Cylindrical Rotor Synchronous Machine.
2. Fault Analysis – I
   - LG Fault
   - LL Fault
3. Fault Analysis – II
   - LLG Fault
   - LLLG Fault
4. Determination of Sub transient reactances of salient pole synchronous machine.
5. Equivalent circuit of three winding transformer
6. Develop a Simulink model for a single area load frequency control problem
7. Y bus formation using MATLAB
8. Z bus formation using MATLAB
9. Gauss-Seidel load flow analysis using MATLAB
10. Fast decoupled load flow analysis using MATLAB

Course Outcomes:

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

1. Experimental determination (in machines lab) of sequence impedance and sub transient reactance of synchronous machine
2. Conducting experiments to analyze LG, LL, LLG, LLLG faults
3. The equivalent circuit of three winding transformer by conducting a suitable experiment.
4. Developing MATLAB program for formation of Y and Z buses.
5. Developing MATLAB programs for gauss-seidel and fast decoupled load flow studies.
6. Developing the SIMULINK model for single area load frequency control problem.

Text Book(s):

1. Power Systems Analysis, Grainger and Stevenson, Tata Mc Graw-hill, 2005.
2. Modern Power system Analysis 2 nd edition, I.J.Nagrath&D.P.Kothari: Tata McGraw-Hill Publishing Company, 2003.

Reference Book(s):

1. Computer Techniques in Power System Analysis 2nd Edition,, M A Pai, TMH, 2005.
2. Computer Techniques and Models in Power Systems, K. Uma Rao, I. K. International, 2007.
3. Electric Power Systems 1st Edition, S. A. Nasar, Schaum's Outline Series, TMH, 1997.
4. Computer Methods in Power System Analysis, E. I. Stagg and El-Abiad, Tata Mc Graw Hill, 1969

DIGITAL COMPUTING PLATFORMS LAB					
Course Code	**L:T:P**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
22A0428P	**0:0:3**	**1.5**	**CIE:30& SEE:70**	**3 Hours**	**PCC**

Course Objectives:

Student will be able to

- Write Assembly language programming on 8086 Microprocessors
- To Interface various devices with 8086
- To develop MASAM Programming
- For Interfacing of 8051 Microcontroller with its peripheral devices.

List of Experiments:

1. Programs for 16-bit arithmetic operations for 8086 (using various addressing modes)
2. Program for sorting an array for 8086
3. Program for searching for a number or character in a string for 8086
4. Program for String manipulations for 8086
5. Interfacing ADC and DAC to 8086.
6. Parallel communication between two microprocessors using 8255.
7. Serial communication between two microprocessor kits using 8251.
8. Interfacing to 8086 and programming to control stepper motor.
9. Programming using arithmetic, logical and bit manipulation instructions of 8051
10. Program and verify Timer/Counter in 8051.
11. Program and verify interrupt handling in 8051.
12. UART operation in 8051.
13. Communication between 8051 kit and PC.
14. Interfacing LCD to 8051.
15. Interfacing matrix or keyboard to 8051

Course Outcomes:

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

- Understand the basic concepts to write assembly language programming on 8086 Microprocessors.
- Understand various device configurations with 8086.
- Design Interfacing of various devices with 8086.
- Understand the basic concepts to write programming on 8051 Microcontroller.
- Analyze Assembly programming of 8051 micro controller.
- Design various Interfacing circuitry with 8051 Microcontroller with its peripheral devices.

Text Book(s):

1. Power Systems Analysis, Grainger and Stevenson, Tata Mc Graw-hill, 2005.
2. Modern Power system Analysis 2 nd edition, I.J.Nagrath&D.P.Kothari: Tata McGraw-Hill Publishing Company, 2003.

Reference Book(s):

1. Ray A. K., Bhurchandi K. M., Advanced Microprocessor and Peripherals, Tata McGraw-Hill Publications, 3rd Edition, 2013.
2. Microprocessor and Interfacing by Douglas V Hall, 2nd Edition, Tata McGraw hill, 1992
3. Microprocessors and Microcontrollers Lab Manual: 8086 & 8051 by Srinivasa Murthy, Kindle Edition.

SOFT SKILLS					
Course Code	**L:T:P**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
22A0029P	**0:0:3**	**1.5**	**CIE:30&SEE:70**	**3Hours**	**PCC**

Course Objectives:

- To encourage all round development of the students by focusing on soft skills.
- To make the students aware of critical thinking and problem-solving skills.
- To develop leadership skills and organizational skills through group activities.
- To function effectively with heterogeneous teams.

Syllabus		**Total Hours: 48**
Unit-I	**Soft Skills & Communication Skills**	**10Hrs**

Introduction, meaning, significance of soft skills –Vital Components of communication skills - Inter-personal skills - Verbal and Non-verbal Communication.

Activities: Narration about self- strengths and weaknesses- clarity of thought - Interpersonal Skills- Group Discussion – Debate – Mutual Understanding - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic. Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- Negotiation skills –Role Play- Non-verbal communication – Public speaking – Mock interviews – Anchoring Skills.

Unit-II	**Critical Thinking**	**10Hrs**

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking.

Activities: Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues – placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis.

Unit-III	**Problem Solving & Decision Making**	**9 Hrs**

State Government and its Administration - Governor - Role and Position -CM and Council of ministers - State Secretariat-Organization Structure and Functions.

Unit-IV	**Emotional Intelligence & Stress Management**	**9 Hrs**

Local Administration - District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI –Zilla Parishath - Elected officials and their roles – CEO,Zilla Parishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Unit-V	**Leadership Skills**	**10Hrs**

Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk Taking - Team Building - Time Management.

Activities: Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc.

Course Outcomes (CO):

On completion of this course, student will be able to

- Memorize various elements of effective communicative skills.
- Interpret people at the emotional level through emotional intelligence.
- Apply critical thinking skills in problem solving.
- Analyze the needs of an organization for team building.
- Judge the situation and take necessary decisions as a leader.
- Develop social and work-life skills as well as personal and emotional well-being

Textbooks:

1. Personality Development and Soft Skills (English, Paperback, Mitra BarunK.)Publisher: Oxford University Press; Pap/Cdr edition (July 22, 2012)
2. Personality Development and Soft Skills: Preparing for Tomorrow, Dr Shikha Kapoor Publisher : I K International Publishing House; 0 edition (February 28, 2018)

ReferenceBooks:

1. Soft skills: personality development for life success by Prashant Sharma, BPB publications 2018.
2. Soft Skills By Alex K. Published by S.Chand
3. Soft Skills: An Integrated Approach to Maximise Personality Gajendra Singh Chauhan, Sangeetha Sharma Published by Wiley.
4. Communication Skills and Soft Skills (Hardcover, A. Sharma) Publisher: Yking books
5. SOFT SKILLS for a BIG IMPACT (English, Paperback, RenuShorey) Publisher: Notion Press .
6. Life Skills Paperback English Dr. Rajiv Kumar Jain, Dr. Usha Jain Publisher: Vayu Education of India.

Online Learning Resources:

1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. https://youtu.be/-Y-R9hDl7lU
4. https://youtu.be/gkLsn4ddmTs
5. https://youtu.be/2bf9K2rRWwo
6. https://youtu.be/FchfE3c2jzc

BASIC WEB DESIGN (SKILL)
(Common to CSE, AIML, CS, DS and EEE)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
22A0511	1:0:2	2	CIE:30& SEE:70	3 Hours	SC

Course Objectives:

This course will enable students to:

- Learn website development using HTML, CSS, and JavaScript.
- Understand the concepts of responsive web development using the bootstrap framework
- Learn the frame concepts to the websites and interactive websites.
- Discover how development process to use Google Charts to provide a better way to visualize data on a website
- Learn Content Management Systems to speed the development process

List of Experiments:

1: HTML: What is a browser, Internet concepts, Introduction to HTML, Basic structure of HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, and Line Breaks HTML Tags.

Task: Design HTML page to display different heading tags and scroll college name as a message.

2: Introduction to elements of HTML, Working with Text, Lists, Hyperlinks, Images, Multimedia.

Task: Design HTML page to display the list of departments in college by using ordered and unordered list.

3: HTML(continued):HTML Tables

Task: Design HTML page to display Class Timetable

4: HTML Frames and Frameset.

Task: Design college website.

5: HTML Form Elements.

Task: Design a Student Registration web page using forms.

6: Cascading Style Sheets(CSS):CSS Properties, Types of CSS, Selectors, box model ,Pseudo-elements, z-index

Task: Apply CSS on student registration form.

7: Bootstrap - CSS Framework: Layouts (Containers, Grid system), Forms, Other Components

Task: Style the student registration Form designed in Module-5still more beautiful using Bootstrap CSS (Re-size browser and check how the webpage displays in mobile resolution).

8: HTTP & Browser Developer Tools: Understand HTTP Headers (Request & Response Headers), URL & its Anatomy, Developer Tools: Elements/Inspector, Console, Network, Sources, performance, Application Storage.

Task: Analyze various HTTP requests (initiators, timing diagrams, responses) and identify problems

9: JavaScript: Variables, Data Types, Operators.

Task: Design a simple JavaScript program to perform arithmetic operations.

10: JavaScript objects, conditions, loops and functions.

Task: Write JavaScript to find the factorial of a given number and generate the Fibonacci series (Recursive and non-Recursive).

11: JavaScript arrays and pop-up box.

Task: Validate all Fields and Submit the student registration Form designed in Module-5

Course Outcomes:

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

- Construct websites with valid HTML,CSS.
- Create responsive monitors.
- Develop websites using jQuery and bootstrap to provide interactivity and engaging user experiences
- Design and Develop JavaScript applications.

- Embed Google chart tools in a website for better visualization of data.
- Design and develop web applications using Content Management Systems like Word Press.

Reference Book(s):

1. Deitel and Deitel and Nieto, ―Internet and World Wide Web-How to Program, Prentice Hall, 5th Edition,2011.
2. Web Technologies, Uttam K.Roy, Oxford Higher Education., 1st edition, 10th impression, 2015.
3. Stephen Wynkoop and John Burke―Running a Perfect Website‖,QUE,2nd Edition,1999.
4. Jeffrey C and Jackson, ―Web Technologies A Computer Science Perspective Pearson Education, 2011.
5. Gopalan N.P. and Akilandeswari J.,―WebTechnology,PrenticeHallofIndia,2011

Web Reference:

1. HTML:https://html.spec.whatwg.org/multipage/
2. HTML:https://developer.mozilla.org/en-US/docs/Glossary/HTML5
3. CSS:https://www.w3.org/Style/CSS/
4. Bootstrap-CSSFramework:https://getbootstrap.com/
5. Browser Develope
6. Tools:https://developer.mozilla.org/enUS/docs/Learn/Common_questions/What_are_browser_developer_tools
7. Javascript:https://developer.mozilla.org/en-US/docs/Web/JavaScript
8. JQuery:https://jquery.com
9. GoogleCharts:https://developers.google.com/chart
10. Wordpress:https://wordpress.com

DESIGN THINKING AND INNOVATION
(Common to CSE, AIML, CS, DS, CE, EEE, ME and ECE)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
22A0031T	2:0:0	0	CIE:30 &SEE:70	3 Hours	MC

Course Objectives:

Student will be able to

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Syllabus — **Total Hours: 32**

Unit-I	INTRODUCTION TO DESIGN THINKING	6Hrs

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

Unit-II	DESIGN THINKING PROCESS	7Hrs

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brain storming, product development Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

Unit –III	INNOVATION	6Hrs

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity. Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

Unit -IV	PRODUCT DESIGN	7Hrs

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies. Activity: Importance of modelling, how to set specifications, Explaining their own product design

Unit –V	DESIGN THINKING IN BUSINESS PROCESSES	6Hrs

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs.

Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes. Activity: How to market our own product, About maintenance, Reliability and plan for startup.

Course Outcomes(CO):

On completion of this course, student will be able to

- Define the concepts related to design thinking.
- Explain the fundamentals of Design Thinking and innovation
- Apply the design thinking techniques for solving problems in various sectors.
- Analyse to work in a multidisciplinary environment
- Evaluate the value of creativity
- Formulate specific problem statements of real time issues

Textbooks:

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

Reference Books:

1. Design Thinking in the Classroom by David Lee, Ulysses press
2. Design the Future, by Shrrutin N Shetty, Norton Press
3. Universal principles of design- William lidwell, kritinaholden, Jill butter.
4. The era of open innovation – chesbrough.H

Online Learning Resources:

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