Baba Ghulam Shah Badshah University Rajouri (J&K)-185131

Syllabus Eighth Semester
B. Tech. Degree Course

Department of Electrical Engineering
College of Engineering and Technology
School of Mathematical Sciences & Engineering
Baba Ghulam Shah Badshah University
Rajouri (J&K)-185131

Curriculum Structure

Semester-VIII

Theory Courses

Course Code	Title	Scheme of Exam				Hrs./Week		
		Duration (Hrs.)	IA	UE	Total Marks	L	T	P
ERE-821	Major Project Phase –II		250	200	450			
	Elective-III	3	40	60	100	3	1	0
	Elective-IV	3	40	60	100	3	1	0
Total			**330**	**320**	**650**			

After the university Exam of semester VII every student shall be allotted a Major Project-II pertaining to his/her stream under the supervision of an allotted mentor. Students are required to report in their respective departments to do preliminary exercise of survey of literature and preparation of a road map of the selected Major Project-II under the supervision of an allotted mentor. Students are required to complete the Major Project-II during semester VIII. Depending upon the infrastructure, Computing and other laboratories facilities the students shall be offered in house project on campus are they can complete their project work in any organization/industry outside the campus. Major Project-II shall be evaluated externally as per university statues.

Elective Papers

- Students will be required to opt for two elective papers, from EE-830 to EE-842.

- The choice of electives will rest with the students. However, in no case will the department run more than two subjects for one elective paper.

Eighth Semester Electives-III & IV	
Course Code	**Course Title**
ERE-830	Principles of Marketing and Management
ERE-831	EHV AC & DC Transmission
ERE-832	Microcontroller & Interfacing
ERE-833	Process Control System
ERE-834	Restructuring of Power System
ERE-835	Biomedical Instrumentation
ERE-836	Electronic Workshop Technology
ERE-837	Energy Economics and Planning
ERE-838	Solar Passive Architecture
ERE-839	Wireless Network
ERE-841	Random Process and Information Theory
ERE-842	Neural Networks and Fuzzy Systems

Course Title: EHV AC & DC Transmission **Max Marks: 100**
Course Code: ERE-831 **University Exam: 60**
Duration of Exam: 3 Hours **Internal Assessment: 40**

Objective: In this course the student gets and in-depth knowledge of various electrical aspects associated with AC & DC transmission of power at Extra High Voltages.

Unit-I

Introduction: Need of EHV transmission, comparison of EHV ac & dc transmission, mechanical considerations of transmission line.

Unit-II

EHV AC Transmission: Parameters of EHV line, over-voltage due to switching, ferroresonance, line insulator and clearance, corona, long distance transmission with series & shunt. Principle of half wave transmission. Flexible ac transmission. EHV AC transmission system, transmission planning and its correlation with generation. Compensations, principle of half wave transmission flexible ac transmission.

Unit-III

EHV DC Transmission: Types of dc links, terminal equipment and their operations, HVDC system control reactive power control, harmonics, multiterminal dc (MTDC) system, ac/dc system analysis, protection of terminal equipments.

Unit-IV

Design of EHV transmission: Transmission network, selection of operating voltage and conductor, calculation of voltage gradient, corona loss, radio interference level

Unit-V

Control of EHV system: Basic principle of control, control implementation, converter firing control system, value blocking and by passing, stopping and power flow reversal.

Text Books:
1. **Rakesh Das Begmudre,** Extra High Voltage AC Transmission Engineering, Wiley Estern Limited.
2. **Padiyar K.R.**, HVDC Power Transmission System ?, Wiley Estern Limited.

Reference Books:
1. **Kimbark E.W.**, EHV-AC and HVDC Transmission Engineering & Practice, Khanna Publishers.

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.

Course Title: Microcontrollers & interfacing   **Max Marks: 100**
Course Code: ERE-832   **University Exam: 60**
Duration of Exam: 3 hours   **Internal Assessment: 40**

Objective: The aim of the subject is to provide basic and necessary information about the Microcontrollers and interfacing.

Unit-I

(Electronics and Micro controller Architecture)

H-Bridge, pull-up and pull-down circuitry, DC-DC converters, Voltage regulators, capcitor based
Filters, Diode rectifiers, Zener regulators (for setting up reference voltages), OP AMPs (Adders,
Subtractor, integrator, instrumentation amplifier), denouncing,
Microcontroller architecture, Pin diagram, instruction set, peripherals of the microcontrollers,

Unit II (Programming tool chain& Low level SW)
(Tool chain)
Cross Compiler, Embedded C-Build Process, and Components of build process: Assembler,
Compiler, Linker, KEIL (tool chain, IDE, debugger, emulator, simulator),
(Low level C programming)
Bit manipulations -Arithmetic instructions-Boolean logical instructions, Special
Functions Registers, Interrupt types, Handling interrupts, Polling, Interrupt
Sequences, External? Internal interrupts, Programming for
Interrupt based applications (ISR), Problems with interrupts, Debugging ISRs,
Interrupt Latency

Unit III (Programming UC internal)
Programming different peripherals of the microcontroller:
Registers, I/O Ports, Interrupts, Timers, USART, UART, I2C, RS232..

Unit IV (Device Interfacing)
LED interfacing, 7 Segments display, toggle switch, LCD interfacing, Keyboard iterfacing, ADC,DAC

Unit V (Projects)
PWM based Motor Control, PID based Temperature controller, Programmable gain controllers.

Text Books:

1. **A.K.Ray and K.M.Bhurchandi**, Microprocessor and Peripherals, TMH.
2. **Kenneth Ayala**, Micro controller and interfacing, TMH.

Semester 8th Electives-III&IV

Course Title: Process Control System   **Max Marks: 100**
Course Code: ERE-833   **University Exam: 60**
Duration of Exam: 3 hours   **Internal Assessment: 40**

Objective: It familiarizes students to modern control theory of various industrial processes.

Unit-I

Process control system: Terms and objectives, piping and instrumentation diagram, instrument terms and symbols, regulator and servo control, classification of variables. Process characteristics: process equation, degrees of freedom modeling of simples systems- thermal, gas, liquid systems, process lag, load disturbance and their effect on processes. Self regulating processes, interacting and non-interacting processes

Unit-II

Controller modes: Basic control action, two position, multiposition, floating control modes. Continuous controller modes: proportional integral and derivative. Composite controller modes: pi pid, pd, integral wind-up and prevention. Auto/manual transfer, bumpless transfer. Response of controllers for different test inputs. Selection of control modes for processes like level, pressure, temperature and flow.

Unit-III

Controller tuning methods: Evaluation criteria- IAE, ISE, ITAE. Process reaction curve method, continuous oscillation method, damped oscillation method. Auto-tuning. Closed loop response of 1st and 2nd order systems, with and without valve, measuring element dynamics.

Unit-IV

Final control elements: Pneumatic control valves, construction details, types, various plug characteristics, valve sizing. Selection of control valves. Inherent and installed valve characteristics. Cavitations and flashing in control valves. Valve actuators and positioners. Instrument air supply specifications.

Unit-V

Advanced control system: Cascade control, ratio control, feed forward control, over-ride, split range and selective control. Multi-variable process control, interaction of control loops. Case studies: distillation column, boiler drum level control and chemical reactor control.

Text Books:
   1. **Stephanopoulos**, "chemical process control", 2nd edition, Prentice Hall.

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.

Course Title: Restructuring of Power System	**Max Marks: 100**
Course Code: ERE-834	**University Exam: 60**
Duration of Exam: 3 hours	**Internal Assessment: 40**

Objective: The restructuring and deregulation of the power utility industry is resulting in significant competitive, technological and regulatory changes. Independent power producers, power marketers and brokers have added a new and significant dimension to the task of maintaining a reliable electric system. This course been made to get students familiar with new ways of structuring of power system.

Unit-I

Introduction: Basic concept and definitions, privatization, restructuring, transmission open access, wheeling, deregulation, components of deregulated system, advantages of competitive system.

Unit-II

Power System Restructuring: An overview of the restructured power system, difference between integrated power system and restructured power system. Explanation with suitable practical examples.

Unit-III

Deregulation of Power Sector: Separation of ownership and operation, Deregulated models, pool model, pool and bilateral trades model, multilateral trade model.

Unit-IV

Competitive electricity market: Independent System Operator activities in pool market, wholesale electricity market characteristics, central auction, single auction power pool, double auction power pool, market clearing and pricing, Market Power and its Mitigation Techniques, Bilateral trading, Ancillary services.

Unit-V

Transmission Pricing: Marginal pricing of Electricity, nodal pricing, zonal pricing, embedded cost, postage stamp method, contract path method, boundary flow method, MW-mile method, MVA-mile method, comparison of different methods.

Text Books:

1. **Loi Lei Lai**, Power System Restructuring and Deregulation, John Wiley & Sons. Ltd.

Reference Books:

1. **Lorrin Philipson and H. Lee Wilis** ,Understanding Electric Marcel Dekker Inc, New York Utilities and Deregulation

Semester 8ᵗʰ Electives-III&IV

Course Title: Biomedical Instrumentation   Max Marks: 100
Course Code: ERE-835   University Exam: 60
Duration of Exam: 3 hours   Internal Assessment: 40

Objective: The aim of the course is to get the students acquainted with the Biomedical Instrumentation.

Unit-I

Introduction to biomedical instrumentation: Introduction of Biomedical Engineering, Biometrics, Man instrument system, Components of Man instrument system. Resting potential, action potential, typical wave form of action potential, propagation of action potential, recording of action potential.

Unit-II

Electrodes, Transducer and Amplifiers: Introduction of Bio-Electrodes, Properties of Bio-Electrodes, different types of electrodes, Sensors, Diaphragms, Force sensors. Introduction of transducers, classification of transducers, Biological Amplifiers (Instrumentation amplifies, chopper amplifiers)

Unit-III

Electro Potential Recording: The heart and cardiovascular system, ECG, EEG, EMG, lead systems and recording methods, typical waveforms and signal characteristics and block diagrams of ECG,EEG,EMG

Unit-IV

Human Assist Devices: Cardiac pacemakers, Classification of Pacemakers, Defibrillators, AC Defibrillators, DC Defibrillators, Indirect measurement, direct measurement, automated indirect method, magnetic blood flow meters, ultrasonic blood flow meter.

Unit-V

Imaging Techniques: Introduction to X-rays, Properties of X-rays, Production of X-rays, Block Diagram of X-ray Machine, Ultrasound in medicine, physics of ultrasonic waves, types, A-mode, M-Mode, Doppler mode, Introduction of Computed tomography, Introduction of MRI.

Text Books:

1. Khandpur, R.S., "**Handbook of Biomedical Instrumentation**", TATA McGraw-Hill, New Delhi, 1997.

Reference Books:
1. Joseph J.Carr and John M.Brown, **Introduction to Biomedical equipment Technology**, John Wiley and Sons, New York, 1997.

2. Leislie Cromwell, **Biomedical instrumentation and measurement**, Prentice Hall of India, New Delhi, 2002

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.

Course Title: Electronics Workshop Technology **Max Marks: 100**
Course Code: ERE-836 **University Exam: 60**
Duration of Exam: 2 hours **Internal Assessment: 40**

Objective: The objective of the subject is to make the students familiar with various troubleshooting techniques of electronic equipments.

Unit-I

Reliability Aspect and Troubleshooting procedure: Equipment failure: Cause of failure, failure rate, MTTF, MTBT, MTTR, maintenance policy. Nature of fault, fault location, fault finding aids, functional area approach, split half method, divergent path, convergent path, feedback path, switching path, systematic trouble shooting checks, ground system.

Unit-II

Test equipment and tools and Electromechanical component: CRO, Multimeters, logic analyzer, logic clip, logic probe, signal generator, hand tools, soft tool. Different type of fuses and fuse holders, different types of switches, cable and connectors, circuit boards, transformers, motors and relays.

Unit-III

Soldering and Desoldering Techniques: Soldering- soldering tools, soldering material (lead free), soldering procedure, soldering Techniques, good and bad solder joints, replacement of components, handling MOS devices, disordering Techniques: SMT, work, desoldering pump, hot air etc.

Unit-IV

Testing of active and passive components: Failure in resistors, capacitors, testing of inductors, Testing of semi-conductor devices**.** Types of failure in diode, special type of diodes, BJT transistors, power transistors, substitute of transistors, FETs, Thyristors, IGBT, Fault diagnosis in OPAMP circuits

Unit-V

Troubleshooting I Audio/video equipment: Analysis of user's complain and report, Physical inspect of the set, Design and Testing of various power supply unit, Identification of faulty section, Identification of faulty stage, Identification of faulty component, Determination of the cause of fault, Repair and servicing, Importance of earthing in electrical installation.

Text Books:

1. **R. S. Khandpur**, Modern electronic equipment Tata McGraw Hill
2. **R. G. Gupta** "Audio Video System".

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.

Course Title: Energy Economics and Planning	**Max Marks: 100**
Course Code: ERE-837	**University Exam: 60**
Duration of Exam: 3 hours	**Internal Assessment: 40**

Objective: The aim of the course is to make the students aware about energy economics and planning.

UNIT-I

Introduction:

Basics in economics; Resources scarcity; Concept of opportunity cost; Law of demand; Derivation of demand curve; Different elastic's of demand; Theory of firm; Production function, Output maximization, cost minimization and profit maximization principles; Input demand function; Different cost concept; Supply curve; Theory of market;

UNIT-II

Energy Economics:

Basic concept of energy economics; Calculation of unit cost of power generation from different sources with examples; Eco-ground rules for investment in energy sector; Payback period, NPV, IRR, and benefit-c.ost analysis with example; Overview of national energy use, energy supply and renewable energy program during different plan period.

UNIT-III

Modeling of energy systems and Policies:

Basic concepts of Econometrics and statistical analysis; Econometric techniques used for energy analysis and forecasting with case studies from India; Operation of computer package Basic concept of Input-output analysis; Concept of energy multiplier; Optimization and simulation methods; Energy & development;

UNIT-IV

Rural energy economics:

Rural economic and social development considerations; Technologies, costs and choice of technology, Demand and benefits forecasting and program development; Economics, financial analysis, and bottlenecks of various decentralized renewable energy electrification program; Analysis of models controlled by local bodies

UNIT-V

Financing of renewable energy systems:

Financial performance ;uncertainties and social cost-benefit analysis of renewable energy systems; financing mechanism of different renewable energy systems; case studies; renewable energy projects for reduction in CO2 emissions

Text books:
1. M. Munasinghe and P. Meier (1993): **Energy Policy Analysis and Modeling**, Cambridge University Press.
2. Dixon, et ai, **Economic Analysis of Environmental Impacts**, Eartscan Publications ltd.,London,.

Reference books:
1. T.e. Kandpal, H. P. Garg, Rnancial Evaluation of Renewable Energy Technology, Macmilan India Ltd.New Delhi, 4003.
2. White J. A., et. aI., Prindples of Engineering of Economic Analysis, John Wiley and Sons. Inc. 1989.

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.

Course Title: Solar Passive Architecture   **Max Marks: 100**
Course Code: ERE-838   **University Exam: 60**
Duration of Exam: 3 hours   **Internal Assessment: 40**

Objective: The aim of the course is to make the students aware about energy conservation with special design of buildings.

Unit-I
Introduction:
Introduction to architecture; Architecture as the art of science of designing buildings; Building science and its significance; Energy management concept in building

Unit-II
Thermal analysis and design for human comfort:
Thermal comfort; Criteria and various parameters; Psychometric chart; Thermal indices, climate and comfort zones; Concept of sol-air temperature and its significance; Calculation of instantaneous heat gain through building envelope; Calculation of solar radiation on buildings; building orientation; Introduction to design of shading devices

Unit-II
Passive cooling and heating concepts:
Passive heating concepts: Direct heat gain, indirect heat gain, isolated gain and sunspaces; Passive cooling concepts: Evaporative cooling, radioactive cooling; Application of wind, water and earth for cooling; Shading.Paints and cavity walls for cooling; Roof radiation traps; Earth air-tunnel.

Unit-IV
Heat transmission in building:
Surface co-efficient: air cavity, internal and external surfaces, overall thermal transmittance, wall and windows; Heat transfer due to ventilation/infiltration, internal heat transfer; Solar temperature;' Decrement factor; Phase lag. Design of day lighting; Estimation of building loads: Steady state method, network method, numerical method, correlations; Computer packages for carrying out thermal design of buildings and predicting performance.

Unit -V
Bio-Climatic classification:
Bioclimatic classification of India; Passive concepts appropriate for the various climatic zones in India; Typical design of selected buildings in various climatic zones; Thumb rules for design of buildings and building codes.

Text books:
1. M.S.Sodha, N.K. Bansal, P.K. Bansal, A. Kumar and MAS. Malik**, Solar Passive Building, Science and Design**, Pergamon Press, 1986.
2. J.R. Williams**, Passive Solar Heating**, Ann Arbar Sdence, 1983.

Reference Books:
1. R.W.Jones, J.D. Balcomb, C.E. Kosiewiez, G.s. Lazarus, R.D. McFarland and W.O. Wray, Passive Solar Design Handbook, Vol 3, Report of U.S. Department of Energy (DOE/CS-0127/3),1982.

NOTE FOR PAPER SETTER: -The Question paper shall comprise Of 10 questions. Two questions will be set from each unit .The student has to attempt five questions selecting one from each unit

Course Title: Wireless Networks   **Max Marks: 100**
Course Code: ERE-839   **University Exam: 60**
Duration of Exam: 3 hours   **Internal Assessment: 40**

Objective: The aim of the subject is to make the students aware of the latest technologies in the field of Wireless Networks.

Unit-I
Cellular wireless Networks:- Introduction: Applications, Replacement of wired Networks, principles of cellular networks, first generation analog, second generation TDMA, second generation CDMA and third generation systems.

Unit-II
Satellite communications:- History, Applications, satellite parameters & configurations- GEO, LEO, MEO, capacity allocation (frequency division, time division), routing, localization, Handover.

Unit-III
Wireless LANS: - Infrared LANS, spread spectrum LANS, narrowband microwave LANS, IEEE 802.11 wireless LAN standard, Bluetooth and IEEE 802.15, wireless local loop.

Unit-IV
Mobile Network Layer:- Mobile IP, Entities and terminology, IP packet delivery, Agent advertisement and discovery, Registration, tunneling and encapsulation, optimizations.

Unit-V
Ad Hoc wireless Networks: - what are Ad Hoc networks? Difference between cellular and Ad Hoc wireless networks, applications, technical & research challenges, Important issues in Ad Hoc wireless networks, the need for MAC, MAC layer protocols for Ad Hoc wireless Networks,   introduction to quality of service (QoS) in Ad Hoc wireless networks.

Text Books:
1. Stallings William, ***Wireless Communications & Networking***, PHI.
2. Pahlavan Kaven, ***Principles of Wireless Networks,***, Pearson Education India.

References:
1. Nicopolitidis, H. S. Obaidat ***Wireless Networks***, John Wiley.
2. Stoimenovic Ivan, ***Handbook of Wireless Networks & Mobile Computing***, CRS Presss.

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.

Course Title: Principles of Marketing & Management   **Max Marks: 100**
Course Code: ERE-840   **University Exam: 60**
Duration of Exam: 3 hours   **Internal Assessment: 40**

Objective:

Unit- I : Forms of Business Organizations
Sole Proprietorship, Partnership, Company-Public and Private Sector Enterprises. Principles of Management, Evolution of Management Function of a Manager.

Unit- II : Function of Management
Planning- Nature and purpose- Types of Plans- Objectives, Policies, Procedures, Rules, Strategies,
Programmes, Projects.

Unit- III : Staffing
Selection-Recruitment Process, Decision Making Process- Types of Decisions Directing, Leadership, Motivation, Communication. Controlling- Processes, Techniques Budgetary and non- Budgetary.

Unit- IV : Financial Management
Short tern and long term sources of Funds- Financing, decision, investment decision, investment decision, introduction to financial, Statements- Production Management- Planning and scheduling, purchasing inventory control.

Unit- V : Marketing Management
Introduction to marketing Mix, Product, Pricing, Promotion and Place. Personnel management, performance appraisal. Conflict- Identification and Resolution Training and development. Introduction to total quality Management, quality circles.

References:
1. Koontz, H & Weihrich, H. Management: A Global Perspective 10th ed.
2. Robbins, S. P. Organizational Behaviour.
3. Prasad, L. M. Principles of management.

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.

Course Title: Random Processes & Inf. Theory   **Max Marks: 100**
Course Code: ERE-841   **University Exam: 60**
Duration of Exam: 3 hours   **Internal Assessment: 40**

Objective: This course has been designed for explaining the basic concepts and principles to the students. Applied and Industrial Aspects have been taken care of in an appropriate manner.

Unit-I

Probability And Random Variable: Axioms of probability - Conditional probability - Total probability – Baye's theorem - Random variable - Probability mass function - Probability density functions- Properties –Moments - Moment generating functions and their properties. Transformation of random variables - Central limit theorem.

Unit-II

Standard Distributions: Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties - Functions of a random variable.

Unit-III

Classification Of Random Processes: Definition and examples, first order, second order, strictly stationary, wide sense stationary and ergodic processes, Markov, Process, Binomial, Poisson and Normal processes - Sine wave process.

Unit-IV

Correlation And Spectral Densities: Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function –Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

Unit -V

Information Theory: Uncertainty, Information and entropy, Source coding theorem, Data compaction, Discrete memory less channels, mutual information, channel capacity, channel coding theorem, Differential entropy, and mutual information for continuous ensembles, information capacity theorem, implication of the information capacity theorem, rate distortion theory, Compression of information*.*

Text Books:

1. **Ross, S-**A First Course in Probability, Fifth edition, Pearson Education, Delhi.
2. **Peebles Jr. P.Z-**Probability Random Variables and Random Signal Principles, Tata McGraw-Hill Publishers, Fourth Edition, New Delhi, 2002.

References:

1. **Stark and Woods John W -**Probability and Random Processes with Applications to Signal Processing, Pearson Education, Third edition, Delhi, 2002.
2. **Veerarajan. T-**Probabilitiy, Statistics and Random process, Tata McGraw-Hill Publications, Second Edition, New Delhi, 2002.

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.

Course Title: Neural Networks and Fuzzy Systems   **Max Marks: 100**
Course Code: ERE-842   **University Exam: 60**
Duration of Exam: 3 hours   **Internal Assessment: 40**

Objective: The principal objective of this subject is to introduce students to neural networks and fuzzy theory from an engineering perspective and their application real world control problems

Unit-I
Introduction to neural networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch- Pitts Model, Historical Developments, Potential Applications of ANN.

Unit- II
Essentials of artificial neural networks: 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.

Unit–III
Feed forward neural networks: Introduction, back propagation algorithm, learning in back propagation, Momentum factor. Applications of back propagation algorithm.

Unit –IV
Fuzzy systems: Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions and its types. Fuzzification, defuzzification .Methods of defuzzification. Fuzzy inference systems

Unit –IV
Application of Neural Networks and Fuzzy Systems: Neural network applications: Process identification, control, fault diagnosis and load forecasting. Fuzzy logic applications: Fuzzy logic control

Text Books:

1. **Jacek M. Zurada**, Introduction to Artificial Neural Systems, PWS Publishing Company, (2001)
2. **S. S Haykin**, Neural Networks: A Comprehensive Foundation, Pearson Education.

Reference Books:

1. **Valluru Rao**, C++ Neural Networks and Fuzzy Logic, Honary Holt & Co *(1998)*
2. **Freeman**, Neural Networks, Pearson Publication (2003).
3. **Rajasekaran & Pai**, Genetic Algorithms ;Synthesis and applications, Prentice Hall of India (2004).

Note for paper setter: The question paper shall comprise of ten questions. Two questions will be set from each unit. The student has to attempt five questions, selecting one question from each unit.