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

## Syllabus Seventh 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-VII

**Theory Courses**

| Course Code | Title | Scheme of Exam | | | | Hrs./Week | | |
|---|---|---|---|---|---|---|---|---|
| | | Duration (Hrs.) | IA | UE | Total Marks | L | T | P |
| ERE-721 | Power System Stability | 3 | 40 | 60 | 100 | 3 | 1 | 0 |
| ERE-722 | Electric Drives | 3 | 40 | 60 | 100 | 3 | 1 | 0 |
| ERE-723 | ED Management | 3 | 40 | 60 | 100 | 3 | 1 | 0 |
| ERE-724 | Major Project Phase –I | 3 | 100 | 0 | 100 | - | - | - |
| | Elective-I | 3 | 40 | 60 | 100 | 3 | 1 | 0 |
| | Elective-II | 3 | 40 | 60 | 100 | 3 | 1 | 0 |
| **Total** | | | **300** | **300** | **600** | | | |

**Laboratory Courses**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ERE-731 | MATLAB | 2 | 25 | 25 | 50 | 0 | 0 | 2 |
| ERE-732 | Seminar | 2 | 50 | 0 | 50 | 0 | 0 | 2 |
| ERE-733 | Industrial Training | 2 | 50 | 0 | 50 | 0 | 0 | 0 |
| **Total** | | | **125** | **25** | **150** | | | |
| **Total (Theory + Lab)** | | | **425** | **325** | **750** | | | |

At the start of VII semester every student shall be allotted a Major Project-I under the supervision of an allotted mentor. Students are required to do preliminary exercise of survey of literature and preparation of a road map of the selected Major Project-I under the supervision of their allotted mentor. Students are required to complete the Major Project-I during semester VII. Major Project-I shall be evaluated internally as per university statutes by a committee consisting of:

i) Head of the Department
ii) One member nominated by Principal
iii) Coordinator(s)/Supervisor(s) of minor project/training

### Elective Papers

- Students will be required to opt for two elective papers, from ERE-741 to ERE-752.
- The choice of electives will rest with the students. However, in no case will the department run more than two courses for one elective paper.

| Seventh Semester Electives-I&II | |
|---|---|
| **Course Code** | **Course Title** |
| ERE-741 | Electric Substation Design |
| ERE-742 | High Voltage Engineering |
| ERE-743 | Virtual Instrumentation |
| ERE-744 | Digital Signal Processing |
| ERE-745 | Power System Transients |
| ERE-746 | Display System Engineering |
| ERE-747 | Embedded System |
| ERE-748 | Artificial Intelligence |

| | |
|---|---|
| ERE-749 | VLSI Design |
| ERE-750 | Simulation and Modeling |
| ERE-751 | Industrial Electronics |
| ERE-752 | Disaster Management |

**Semester VII**

**Course Title: Power System Protection** **Max Marks: 100**
**Course Code: ERE-721** **University Exam: 60**
**Duration of Exam: 3 hours** **Internal Assessment: 40**

**Objective:** This course makes the student familiar with various types of protection schemes & equipments used for protection of electrical power system.

**Unit-I**

**Relays:** Function of protective relaying, fundamental principles, primary and backup relaying, functional characteristics. Operating principles and characteristics of the following electromechanical relays:
Current, voltage, directional, current balance, voltage balance, differential relays, and distance relays.

**Unit-II**

**Protection of Generators &Transformers:** Short- circuit protection of stator windings, Overheating protection, Overvoltage protection, Protection against vibration, protection against motoring over speed.
Short circuit protection, over current and earth-fault protection differential protection. Use of biased relay for differential protection, self balance system protection, differential magnetic balance protection, Buchholz relay, protection of parallel transformer banks.

**Unit-III**

**Protection of Feeders, Busbars and Transmission Lines:** Protection of feeders, time limit fuse, over current protection for radial feeders, protection of parallel feeders, differential protection for parallel feeders, differential pilot wire protection, Circulating current protection, protection for bus-bars.

**Unit-IV**

**Fuses:** Fusing element, classification of fuses, current carrying capacity of fuses, high rupturing capacity (H.R.C.) cartridge fuses, characteristics of H.R.C. fuses, selection of HRC fuses. MCBs

**Unit-V**

**Circuit Breaker:** Types of circuit breakers, basic principle of operation, phenomena of arc, initiation of a arc, maintenance of arc, arc extinction, d.c. circuit breaking, a.c. circuit breaking, arc voltage and current waveforms in a.c. circuit breaking, restricting and recovery voltages, de-ionization and current chopping, ratings of circuit breakers, oil circuit breakers, air blast circuit breakers, SF6 Circuit breakers, Vacuum breakers.

**Text Books:**


1. **C.R Mason**, The Art and Science of Protective Relaying, John Wiley & Sons
2. **Badri Ram,** Power System Protection and switchgear, TMH


**Reference Books:**


1. **J. L Black. Burn**, Protective relaying, Principles and Applications.

**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 at least one from each unit.

**Semester VII**

**Course Title: Electrical Drives** **Max Marks: 100**
**Course Code: ERE-722** **University Exam: 60**
**Duration of Exam: 3 hours** **Internal Assessment: 40**

**Objective:** This course makes a student familiar with various types of AC & DC drives and their industrial applications.

**Unit-I**

**Converter fed D.C Drives:** Phase-controlled converter fed D.C Drives, Analysis and performance of drive in continuous and discontinuous conduction modes, Harmonics and p.f, methods of improvement of i/p p.f in phase-controlled converter fed d.c drives, PWM rectifiers

**Unit-II**

**Chopper Fed D.C Drive:** Chopper-controlled D.C Drives, single and multi-quadrant operation in continuous and discontinuous modes, dynamic, regenerative and composite braking (more stress on self-commutated devices), Closed loop control of D.C. drives.

**Unit-III**

Adjustable-voltage control of induction motor drives. Frequency control of induction motor drives (v/f control) using VSI, CSI, PWM VSI, PWM CSI inverters, Cycloconverter-controlled AC drives.

**Unit-IV**

Slip power controlled induction motor drives, static rotor-resistance control, static Kramer drive, mathematical modeling of induction motor drives, transient response and stability analysis

**Unit-V**

Synchronous motor drives, SRM drives, static excitation scheme of alternators.

**Text Books:**

1. **G.K. Dubey,** Fundamentals of Electrical Drives.
2. **B.K. Bose**, Power Electronics and variable frequency drives.

**Reference Books**:

1. **G.K. Dubey**, Power semi-conductor controlled drives.
2. **J.M.D Murphy** and **Turnbull,** Power Electronic control of A.C Motors.

**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 at least one from each unit.

**Semester VII**

**Course Title: Entrepreneurship Dev & Management** **Max Marks: 100**
**Course Code: ERE-723** **University Exam: 60**
**Duration of Exam: 3 hours** **Internal Assessment: 40**

**Objective:** Course is designed to acquaint the students with the skills required to become entrepreneurs and to create an awareness of the need for systematic management of projects.

**Unit-I**

**Entrepreneurship Development**: Meaning, objectives, type of entrepreneurs, importance of entrepreneurship training, factors affecting entrepreneurship, linkage between entrepreneurship and economic development, problem of increasing unemployment, balanced regional growth, harnessing locally available resources, New Industrial Policy and innovation in enterprises.

**Unit-II**

**Entrepreneurship Support System**: Small Industries Development Bank of India, Small Industries service Institute, State Small Industries and Export Corporation, District Industrial Centres and Other supporting agencies.

**Unit-III**

**Project Report Preparation**: Identifying business opportunities, Project report and its importance, various contents of project report: managerial and entrepreneurial capabilities, socio-economic benefits, Demand analysis, technical feasibility and financial viability.

**Unit-IV**

**Introduction to Marketing Management**: Brief introduction to various types of product strategies, Pricing strategies, Channel strategies and Promotional strategies.
**Introduction to Production Management**: Types of production systems, production planning and control, functions of Production Manager and Materials Management.

**Unit-V**

**Introduction To Human Resource Management**: Manpower Planning, Recruitment, selection, placement and induction, training and development, compensation.
**Introduction to Financial Management**: source of finance and Working Capital management.

**Text Books:**


1. **Holt David H**, Entrepreneurship: New Venture Creation, PHI (4000).
2. **Saini Jasmer Singh**, Entrepreneurship Development Programmes and Practices, Deep and Deep Publications, New Delhi (1998).


**Reference Books:**


1. **Dollinger**, Entrepreneurship Strategies and Resources, Pearson Education (4003).
2. **Jose Paul & Kumar Ajith N**, Entrepreneurship Development and Management, Himalaya Publishers, New Delhi (4000).
3. **Hisrich Robert D and Micheal Peters P**, Entrepreneurship, TMH, (4002).


**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 at least one question from each unit.

**Semester VII**

**Course Title: Major Project -1** **Max Marks: 100**
**Course Code: ERE-724** **University Exam: 0**
**Internal Assessment: 100**

At the start of VII semester every student shall be allotted a Major Project-I under the supervision of an allotted mentor. Students are required to do preliminary exercise of survey of literature and preparation of a road map of the selected Major Project-I under the supervision of their allotted mentor. Students are required to complete the Major Project-I during semester VII. Major Project-I shall be evaluated internally as per university statutes by a committee consisting of:

i. Head of the Department
ii. One member nominated by Principal
iii. Coordinator(s)/Supervisor(s) of minor project/training

**Semester Seventh Electives-I&II**

**Course Title: Electric Substation Design** **Max Marks: 100**
**Course Code: ERE-741** **University Exam: 60**
**Duration of Exam: 3 hours** **Internal Assessment: 40**

**Objective:** This subject familiarizes students with designing of various types of electrical substations and associated equipments.

**Unit-I**

**Sub-Station Design:** General aspects of sub-station design, Site consideration, design consideration and environmental consideration of substation, layout with all equipments.

**Unit-II**

**Bus-Bar Design:** Bus bar arrangement with detailed layout-single bus-bar arrangement, single sectionalized bus-bar scheme, main and transfer bus-bar scheme, ring bus scheme, breaker and half scheme, double bus bar arrangement, double bus and transfer bus arrangement.

**Unit-III**

**Switch Operation:** Isolating switches, location, rating, selection, operation and control. Interlocking- mechanical and electrical , rating and selection of isolators.

**Unit-IV**

**Transformers and Circuit Breakers:** Voltage & Current Transformers. Governing specifications, rating & selection requirement of CT's & PT's for different protection schemes. Standard ratings & selection. Restricting voltage & recovery voltage, particular performance & testing of circuit breaker.

**Unit-V**

**Control & Relay panels:** Design of control & relay panels. Planning of control circuit. Voltage selection scheme. General earthing of a substation. Complete design of earthing grid.

**Text Books:**

1. **P.S Satnam**, Substation Design.

**Reference Books:**

2. **P.V Gupta**, Substation Design and Equipments. Dhanpat Rai Publications

**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 at least one question from each unit.

**Semester Seventh Electives-I&II**

**Course Title: High Voltage Engineering** **Max Marks: 100**
**Course Code: ERE-742** **University Exam: 60**
**Duration of Exam: 3 hours** **Internal Assessment: 40**

**Objective:** This course familiarizes the students with working principles, operation, measurement and testing of high voltage systems and equipments.

**Unit-I**

**Conduction and Breakdown in Gases:**
Gases as insulators, ionization, current growth, Townsend's criterion for breakdown, electro-negative gases, Paschen's Law, Streamer breakdown mechanism, corona discharges, post breakdown phenomena, practical considerations in using gases for insulating materials.

**Unit-II**

**Conduction and Breakdown in Liquid Dielectrics:**
Classification of liquid dielectrics, conduction and breakdown in pure liquids and in commercial liquids.

**Unit-III**

**Breakdown in Solid Dielectrics**:
Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, breakdown of composite insulation, solid dielectric used in practice.

**Unit-IV**

**Applications of insulating materials in different electrical apparatus**:
Applications in power transformers, rotating machines, circuit breakers, cables, power capacitors, electronic equipment.

**Unit-V**

**Generation & Measurement of High Voltages and Currents**:
Generation of high d.c. and a.c. voltages, generation of impulse voltages and currents. Measurement of high d.c., a c. and impulse voltages, Measurement of high d.c, a.c and impulse currents.

**Text Books:**

1. **E. Kuffel, W.S Zaengl**, High Voltage Engineering Fundamentals,TMH
2. **M.S. Naidu, V. Karamraju**, High Voltage Engineering,TMH

**Reference Books:**

3. **Dieter kind, Kurt Feser**, High voltage test techniques.
4. **Subir Ray,** An Introduction to High Voltage Engineering.

**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.

**Semester Seventh Electives-I&II**

**Course Title: Virtual Instrumentation** **Max Marks: 100**
**Course Code: ERE-743** **University Exam: 60**
**Duration of Exam: 3 hours** **Internal Assessment: 40**

**Objective:** In this course the student gets and in depth knowledge of Virtual Instruments and their applications in the field.

**Unit-I**

**Virtual Instrumentation**: Historical perspective, advantages, blocks diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming. Development of Virtual Instrument using GUI, Real-time systems, Embedded Controller, OPC, HMI / SCADA software, Active X programming.

**Unit-II**

**Programming Techniques**: VIs and sub-VIs, loops and charts, arrays, dusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, Publishing measurement data in the web.

**Unit-III**

**Data Acquisition Basics**: Introduction to data acquisition on PC, Sampling fundamentals, Input/output techniques and buses. ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirement.

**Unit-IV**

**Chassis Requirements:** Common Instrument Interfaces: Current loop, RS *232C/* RS485, GPIB. Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, Fire wire. PXI system controllers, Ethemet control of PXI. Networking basics for office & Industrial applications, VISA and M.

**Unit-V**

**Applications**: Virtual instrumentation Toolsets, Distributed I/O modules. Application of Virtual Instrumentation: Instrument Control, Development of process database management system, Simulation of systems using VI, Development of Control system, Industrial Communication, Image acquisition and processing, Motion control

**Text Books:**


1. **Gary Johnson**, "LabViEW Graphical Programming, 2nd Edition, McGraw Hill, New York, 1998.
2. **Usa K. Wells & Jeffrey Travis**, "LabViEW for everyone', Prentice Hall, New Jersey, 1998.


**Reference Books:**


1. **Jane W. S. Liu**, ''Real-time Systems~ Pearson Education India, 4001.
2. **Jean J. Labrosse**, ''Embedded Systems Building Blocks: Complete and ready-to-use Modules in CN.


**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.

**Semester Seventh Electives-I&II**

**Course Title: Digital Signal Processing** **Max Marks: 100**
**Course Code: ERE-744** **University Exam: 60**
**Duration of Exam: 3 Hours** **Internal Assessment: 40**

**Objective:** The course is design to acquaint student with basic concepts and principles Digital Signal Processing along with its applied and industrial aspects.

**Unit-I**

**The Discrete Fourier Transform:** Discrete Fourier transform (DFT), DFT as a Linear Transformation, Relationship of DFT to other Transforms. Properties of DFT: Periodicity, Linearity and Symmetry, Multiplication of Two DFT's and Circular Convolution, Linear Filtering Methods Based on DFT: Use of DFT in Linear Filtering, Filtering of Long Data Sequences.

**Unit-II**

**Fast Fourier Transform:**-Efficient Computation of the DFT: Computational complexity; FFT algorithms: decimation-in-time and decimation-in-frequency; The Goertzel Algorithm, The Chirp-Z Transform Algorithm.

**Unit-III**

**Design of Digital IIR Filters:** Design of IIR Filters from Analog Filters: IIR Filter Design: by Approximation of Derivatives, by Impulse Invariance, by the Bilinear Transformation and by Matched-Z Transformation. Some examples of Digital Filters Designs based on the Bilinear Transformation. Frequency Transformations: Frequency Transformations in the Analog Domain, Frequency Transformations in the Digital Domain.

**Unit-IV**

**Design of Digital FIR Filters:** Design of FIR Filters: Symmetric and Antisymetric FIR Filters, Design of Linear-Phase FIR Filters: Using Windows and by the Frequency-Sampling Method. Design of Optimum Equiripple Linear-Phase FIR Filters. Design of FIR Differentiators. Design of Hilbert Transformers. Comparison of Design Methods for Linear-Phase FIR filters.

**Unit-V**

**Implementation of Discrete-Time Systems:** Structures for the Realization of Discrete-Time Systems. Structures for FIR Systems: Direct-Form Structures, Cascade-Form Structures. Structures for IIR Systems: Direct-Form Structures, Signal Flow Graphs and Transposed Structures, Cascade-Form Structures, Parallel-Form Structures
**Applications of DSP:** Application of DSP in Communication, Signal processing, Image Processing.

**Text Books:**


1. **J. G. Proakis and D. G. Manolakis**: DSP, 3rd Edition, Pearson Education, 2003.
2. **Johnny Johnson**: Digital Signal Processing, 3rd Edition, PHI.


**Reference Books:**


1. **R. J. Schilling & S. L. Harris**, Fundamentals of DSP, Thomson, 2005.


**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 at least one from each unit.

**Semester Seventh Electives-I&II**

**Course Title: Power System Transients** **Max Marks: 100**
**Course Code: ERE-745** **University Exam: 60**
**Duration of Exam: 3 Hours** **Internal Assessment: 40**

**Objective:** This course makes a student familiar with the transient phenomenon occurring in electrical power system-their origin, effects and control.

**Unit-I**

**Surges and Transients:**Origin and nature of transients and surges, Surge parameters of plan. Equivalent circuit representations. Lumped and distributed circuit transients.

**Unit-II**

**Transient Control:** Line energization and de-energization transients. Earth and earth wire effects. Current chopping in circuit breakers. Short line fault condition and its relation to circit breaker duty. Trapped charge effects. Effect of source and source representation in short line fault studies. Control of transients.

**Unit-III**

**Wave Control:** Lightening Phenomenon. Influence of tower footing resistance and earth resistance. Traveling waves in distributed parameter multi conductor lines, parameters as a function of frequency.

**Unit-IV**

**Simulation:** Simulation of surge diverters in transient analysis. Influence of pole opening and pole reclosing.

**Unit-V**

**Insulation coordination:**Insulation Co-ordination: Over voltage limiting devices, dielectric properties, breakdown of gaseous insulation, tracking and erosion of insulation, high current arces, metallic contacts.

**Text Books Unit-**:


1. **Lou van der Sluis,** Transients in Power Systems John Wiley & Sons.
2. **Vanikov V. A.,** Transients in Power Systems by, Mir Publications, Moscow.


**Reference Books:**


1. **Bewley L.V.,** Traveling Waves on Transmission Lines Dover Publications Inc., New York.
2. **Ravindera Arora, Wolfgang Mosch**, High Voltage Insulation Engineering, New Age International Publishers Limited.
3. **Greenwood A.** Electrical Transients in Power Systems John Wiley & Sons.


**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.

**Semester Seventh Electives-I&II**

**Course Title: Display Systems Engineering** **Max Marks: 100**
**Course Code: ERE-746** **University Exam: 60**
**Duration of Exam: 3 hours** **Internal Assessment: 40**

**Objective:** The principal objective of this subject is to introduce students to Display System Engineering.

**Unit-I**

**Introduction to Display Systems:** Character of the Display Field, Processing System, Component System, Da
ta Organization and Display Technology, Structure of the Information Display Technology. Display System Development: High Definition Displays, Aural Component of Visual Realism, Display Systems.

**Unit-II**

**Principle of Vision and Application of Visual Properties:** Sources of Illumination, Luminance and Colour, Response of Eye, Photometry Quantities, Colour Representation, Function of Camera, Television System, Video Colorimetry, Video System Characteristics, Working Principle and Display Application of LED, Liquid Crystal and Plasma Devices.

**Unit-III**

**Measuring Display Parameters:** Visual Acuity, Contrast, Flicker, Visual Spectrum. Measurement of Colour Displays and Application of Zone Pattern Signal.

**Unit-IV**

**Broadcast Sound Display:** Basic Sound, Behavior of Sound Waves, Hearing Concept, Loud Speakers, Basic Stereo, Processing of Audio, Digital Audio, Dolby System, Surround Sound System.

**Unit-V**

**Recording:** Video Cassette Recorders, Video Tape Characteristics, Tape Recording and Playback. Digital Video Disc (DVD): DVD Technology, Disc and Data Details DVD Audio-DVD Video, DVD.

**Text Books:**


1. **Jerry Whitaker**, Electronic Displays Technology, Design, and Applications, McGraw-Hill International Editions. 1994.
2. **H. R. Luxenberg, L. Kuehn**, Display Systems Engineering, TMH.


**Reference Books:**


1. **Jim Taylor**, DVD Demystified Second Edition, TMH, Edition, 2001.
2. **Michael Talbot Smith**, Broadcast Sound Technology, Second Edition, Butterworth-Heinemann Ltd. 1990.
3. **Ponkove J. I.**, Display Devices Topics in Applied Physics, Vol-40, Springer Verlag, Berlin Heidelberg New York, 1980.


**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.

**Semester Seventh Electives-I&II**

**Course Title: Embedded Systems** **Max Marks: 100**
**Course Code: ERE–747** **University Exam: 60**
**Duration of Exam: 3 hours** **Internal Assessment: 40**

**Objective:** The aim of the subject is to help the learners to understand the fundamentals of Embedded Systems.

**Unit-I**

**Introduction to Embedded Systems**: Hardware and Software Components: Types, Examples, Characteristics and Challenges in Embedded Computing System Design, Embedded System Design Processes.

**Unit-II**

**Architecture of Embedded System:** Hardware Components: SOC, Processors, CPU, Types of Memory, Memory Management, I/O Devices and Interfacing. Software Components: Interpreter, Compiler, Assembler, Cross Assembler, RTOS, Languages for Embedded Applications, Hardware and Software Architecture. Examples: Cell Phone, Smartcard, Digital Thermometer.

**Unit-III**

**OS for Embedded Systems**: Introduction to Real Time Theory. Operating System Services. Real Time Operating System Concepts. Basic Design using an RTOS. Underground Tank Monitoring System.

**Unit-IV**

**Performance Issues of an Embedded System**: CPU Performance. CPU Power Consumption. Analysis and Optimization of CPU Power Consumption Program Execution Time. Analysis and Optimization of Energy and Power. Analysis of Program Size. Hardware Accelerators.

**Unit -V**

**Design Examples**: Personal Digital Assistants. Set Top Boxes. Ink Jet Printers. Telephone PBX. Introduction to Micro C/OS-II Operating System and Its Uses.

**Text Books:**


1. **Wayne Wolf**, Computer as Components, Principles of Embedded Computing System Design, Harcourt India Pvt. Ltd.,
2. **David E Simon**, An Embedded Software Primer, Pearson Education,


**Reference Books:**


1. **Raj Kamal**, Embedded Systems, Architecture, Programming and Design, TMH.
2. **Sriram V Iyer, Pankaj Gupta**, Embedded Real time Systems Programming, TMH.
3. **K.V.K.K. Prasad**, Embedded/Real time Systems: Concepts, Design and Programming, Dreamtech Press.


**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.

**Semester Seventh Electives-I&II**

**Course Title: Artificial Intelligence** **Max Marks: 100**
**Course Code: ERE-748** **University Exam: 60**
**Duration of Exam: 3 hours** **Internal Assessment: 40**

**Objective:** The objective of this subject is to complement and broaden what students learn in the subject Artificial Intelligence and Natural Language Processing.

**Unit- I**

**Introduction to Artificial Intelligence.** Problem Solving Concepts. Definition of Pattern Recognition. Production System. Problem and Production. System Characteristics. Two Path Problem. Analysis of Artificial Intelligence Techniques. Criteria and Success.

**Unit- II**

**Knowledge Representation**. Formal And Non-Formal Logic. Representation Evaluation Criteria. Level Of Representation. Formal Logic Schemes. Resolutions. Predicate And Proportional Logic. Conversion To Clause Form. Semantic Networks. Frames. Scripts. Production Systems.

**Unit- III**

**Problem Solving Algorithms and Fuzzy Logic:** Problem Solving Strategies. Dealing with Uncertainty. Defining the Problem. Control Strategies. Exhaustive Search. Generate and Test. Matching. Weak Methods. Hill Climbing. Breadth and Depth First Searches. Search Algorithms Based on Probability. Fuzzy Reasoning.

**Unit- IV**

**Neural Networks:** Principles and Promises. Pattern and Pattern Recognition Tasks. Conventional Methods Scope.

**Unit- V**

**Expert System:** Introduction to Expert System Development. Matlab Simulation.

**Text Books:**

1. **Flante Rich,** Artificial Intelligence.
2. **Nilson and Springer**, Principles of Artificial Intelligence.

**Reference Books:**

1. **David W. Rolston**, Principles of Expert System Development

**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.

**Semester Seventh Electives-I&II**

**Course Title: VLSI Design** **Max Marks: 100**
**Course Code: ERE-749** **University Exam: 60**
**Duration of Exam: 3 Hours** **Internal Assessment: 40**

**Objective:** The 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**

**CMOS Technology**: An overview of Silicon semiconductor technology, Basic CMOS technology : nwell, P well, Twin tub and SOI Process. Interconnects, circuit elements: Resistors, capacitors, electrically alterable ROMs, bipolar transistors, Latch up and prevention. Layout design rules, physical design: basic concepts, CAD tool sets, physical design of logic gates: Inverter, NAND, NOR, Design Hierarchies.

**Unit-II**

**MOS Transistor Theory :** NMOS, PMOS Enhancement transistor, Threshold voltage, Body effect, MOS DC equations, channel length modulation, Mobility variation, MOS models, small signal AC characteristics, complementary CMOS inverter DC characteristics, Noise Margin, Rise time, fall time, power dissipation, transmission gate, tristate inverter.

**Unit-III**

**Specification Using Verilog HDL** :Basic Concepts: VLSI Design flow, identifiers, gate primitives, value set, ports, gate delays, structural gate level and switch level modeling, Design hierarchies, Behavioral and RTL modeling: Operators, timing controls, Procedural assignments conditional statements, Data flow modeling and RTL. Structural gate level description of decoder, equality detector, comparator, priority encoder, D-latch, D-ff, half adder, Full adder, Ripple Carry adder.

**Unit-IV**

**CMOS Chip Design:** Logic design with CMOS: MOSFETS as switches, Basic logic gates in CMOS, Complex logic gates, Transmission gates: Muxes and latches, CMOS chip design options: Full custom ASICs, Std. Cell based ASICs, Gate Array based ASICs Channelled, Channelless and structured GA, Programmable logic structures; 22V10, Programming of PALs, Programmable Interconnect, Reprogrammable GA: Xilinx programmable GA, ASIC design flow.

**Unit-V**

**CMOS Testing**: Need for testing, manufacturing test principles, Design strategies for test, Chip level and system level test techniques.

**Text Books:**


1. **Weste & Eshraghian**-Principles of CMOS VLSI design (2/e) Addison Wesley.
2. **Samir Palnitkar-**Verilog HDL - Guide to Digital design and synthesis, III edition, Pearson Education, 2003 .


**Reference Books:**


1. **M.J.S.Smith**- Application Specific integrated circuits, Pearson Education, 1997.
2. **Wayne Wolf**- Modern VLSI Design, Pearson Education 2003.
3. **Bob Zeidmin -** Introduction to verilog, Prentice Hall, 1999.


**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.

**Semester Seventh Electives-I&II**

**Course Title: Simulation & Modeling** **Max Marks: 100**
**Course Code: ERE-750** **University Exam: 60**
**Duration of Exam: 3 hours** **Internal Assessment: 40**

**Objective:** The aim of this subject is to provide the basic knowledge of fundamental concepts of simulation and simulation languages.

**Unit-I**

**Fundamentals:** Definition and reasons for simulation. Continuous (time-oriented) and discrete (event) systems, Modeling/programming simple deterministic systems, Rates and system dynamics.

**Unit-II**

**Concepts in Simulation:** Stochastic variables; discrete vs. continuous probability; algorithms for generating random numbers, their comparison with respect to speed & validity; continuous uniformly distributed random numbers; methods for generating non-uniform distributions.

**Unit-III**

**Building Simulation Programming Models:** Arrival patterns, service times, and queue formation. Formulating systems as events and entities (such as resources, queues, gates, and linkages). Congestion in systems; arrival patterns; Poisson arrivals; the exponential distribution; the coefficient of variation; service times; normal distribution; queuing disciplines; Measures for Queues; Analytic Solutions of Queuing Problems; Utilization as a Design Factor; Other factors like grade of service.

**Unit-IV**

**Discrete Event System Simulation:** Discrete events; representation of time; queues and servers; generation of arrival patterns; resource seizing; departures simulation of a telephone system and computer networks; simulating components of an operating system; delayed calls; modeling policies; priority queues; tasks; gathering statistics; counters and summary statistics; measuring utilization and occupancy; recording distributions and transit times.

**Unit-V**

**Introduction to Simulation Languages:** Simulation in C++, GPSS, Simulations Packages. Trends in simulation Software. SIMSCRIPT programs; SIMSCRIPT system concepts; organization of a SIMSCRIPT program; blocks, names, and labels; SIMSCRIPT statements; entities, events, and activities; defining the system; defining the system model; referencing variables; the procedural structures; arrival event; timing routine; disconnect event; closing event; execution, debugging and validation; interpreting outputs and system optimization via modification.

**Text Books:**


1. **Law and Kelton**, Simulation Modeling and Analysis, McGraw-Hill, 3rd Edn. 2000.
2. **Banks**, Discrete-Event System Simulation, (Second Edition), Prentice-Hall, 1996.


**Reference Books:**


1. **Dunning**, Getting Started in GPSS, , Engineering Press, San Jose, CA, 1985.


**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.

**Semester Seventh Electives-I&II**

**Course Title: Industrial Electronics** **Max Marks: 100**
**Course Code: ERE–751** **University Exam: 60**
**Duration of Exam: 3 hours** **Internal Assessment: 40**

**Objective:** The 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**

**D.C. Motor Control:** Control of d.c. motor using half controlled and fully-controlled single-phase and three-phase thyristor converters, control of d.c. motor using choppers of different configurations.

**Unit-II**

**A.C. Motor Control:** Stator voltage control of induction motors, control of induction motors using voltage source and current source inverters, slip-ring induction motor control.

**Unit-III**

**Industrial circuits**: Temperature control circuit, AC voltage regulators, fan regulators/ lamp dimmers, uninterrupted power supplies (UPS). Relays and Timers: The relay (basic construction), AC relay, Reed relay, Solid state relay, 555 timer and its industrial applications.

**Unit-IV**

**Design Of Printed Circuit Boards :**Introduction to technology of printed circuit boards (PCB), General lay out and rules and parameters, PCB design rules for Digital, High Frequency, Analog, Power Electronics and Microwave circuits, Computer Aided design of PCBs.

**Unit-V**

**Industrial Appliances Design:** Power Transformers and Voltage Stabilizers, Design of 0.5 and 1.0KVA Voltage Stabilizers, Design of Inverters and Battery Chargers for domestic use.

**Text Books**:


1. **Mohan N Undeland, T.M. Robins, W.P**. power electronics- converters, application & design, John Wiley 1989
2. **Bose B.K**., Power electronics and A.C Drives, Prentice Hail 1986.


**Reference Books**:


1. **Dubey G.K. Asarbada, E.R, K**. power electronics devices, IETE book, TMH.
2. **Murphy J.M.D Turnnbull, F.G** power electronics control of A.C motors .
3. **Rashid M.H**. power electronics- circuits, devices, application, Prentice Hall India.


**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.

**Semester Seventh Electives-I&II**

**Course Title: Disaster Management** **Max Marks: 100**
**Course Code: ERE-752** **University Exam: 60**
**Duration of Exam: 3 hours** **Internal Assessment: 40**

Objectives: The aim of the course is to acquaint the students about the disaster, and its management.

**UNIT -I**
**Introduction to Disaster:** Concept, and definition (Disaster, Hazards, Vulnerability, Resilience, Risk)

**UNIT-II**
**Disaster:**
**Classification, Causes and Impacts** (including social, economic, political, environmental, health etc). Differential Impact- in term of caste, class, gender, age, location, disability.Global trends in disasters, urban disaster, pandemics, complex emergencies, Climate change

**UNIT-III**
**Approaches to Disaster Risk reduction:** Disaster cycle – its analysis, Phase, Culture of safety, prevention, mitigation and preparedness, community based DRR, Structural-nonstructural measures, roles and responsibilities of community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/URBs), state, Centre and other stake-holders.

**UNIT-IV**
**Inter- relationship between Disasters and Development:** Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land – use etc. Climate Adaption, Relevance of indigenous knowledge, appropriate technology and local recourses..

**UNIT-V**
**Disaster Risk Management in India:** Hazard and Vulnerability profile of India
Components of Disaster Relief: Water. Food, Sanitation, Shelter, Health, Waste Management.
Institution arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, Plans, programmes and legislation)

Text Books:

1. **KrishnaMurthy** et-al" disaster Management: global challenges" Universities Press 2009.
2. Bhatacharia T, " Disaster Science and Management, TMH.


Reference Books:

1. Mullik N.H, " Disaster Management " Enkay Publishing House.


**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.