VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Affiliated to JNTUH, Approved by AICTE, Accredited by NAAC and ISO 9001:2008 Certified
Shamshabad - 501 218, Hyderabad, Telangana State, India.
www.vardhaman.org

BACHELOR OF TECHNOLOGY
ELECTRICAL AND ELECTRONICS ENGINEERING

SYLLABI (III Year and IV Year)

B. Tech. - Regular Four Year Degree Program
(For batches admitted from the Academic Year 2013 - 2014)
&
B. Tech. - Lateral Entry Scheme
(For batches admitted from the Academic Year 2014 - 2015)

SYLLABI FOR V SEMESTER

B. Tech. EEE V SEMESTER

OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to EEE & ECE)

Course Code: **A1506**

L	T	P	C
4	-	-	4

UNIT - I

OBJECT ORIENTED THINKING: Need for object oriented programming paradigm, a way of viewing world agents and Communities, messages, methods, responsibilities, Classes and Instances, Class Hierarchies-Inheritance ,Method Binding, Overriding and Exceptions.

JAVA BASICS: History of Java, Java buzzwords, JVM architecture, data types, variables, scope and life time of variables, arrays, operators, control statements, type conversion and casting, simple java program, constructors, methods, string and String Buffer handling functions.

UNIT - II

INHERITANCE AND POLYMORPHISM: Basic concepts, types of inheritance, member access rules, usage of this and super key word, method overloading, method overriding, abstract classes, dynamic method dispatch, usage of final keyword, static import.

PACKAGES AND INTERFACES: Defining package, access protection, importing packages, defining and implementing interface, and variables in interface and extending interfaces.

I / O STREAMS: Concepts of streams, stream classes- byte and character stream, reading console input and writing console output, File: introduction to file, reading and writing to a file.

UNIT - III

EXCEPTION HANDLING: Exception handling fundamentals, exception types, uncaught exceptions, usage of try, catch, throw, throws and finally keywords, built-in exceptions, creating own exception sub classes.

MULTI THREADING: Concepts of thread, thread life cycle, creating threads using thread class and runnable interface, synchronization, thread priorities, inter thread communication.

UNIT - IV

AWT CONTROLS: The AWT class hierarchy, user interface components- labels, button, text components, check box, check box groups, choices, list box, panels - scroll pane, menu, scrollbars. Working with frame windows, color, font and layout managers.

EVENT HANDLING: Events, event sources, event listeners, relationship between event sources and listeners, delegation event model, handling mouse and keyboard events, adapter classes, inner classes.

UNIT - V

SWINGS: Introduction to swings, hierarchy of swing components. Containers, top level containers - JFrame, JWindow, JDialog, light weight containers - JPanel, swing components - JButton, JToggleButton, JCheckBox, JRadioButton, JLabel, JTextField, JTextArea, JList, JComboBox, JTable, JTree, JTabbedPanes, JScrollPane.

APPLETS: Life cycle of an applet, inheritance hierarchy for applets, differences between applets and applications, developing applets, simple applet display methods, passing parameters to applets.

TEXT BOOKS:

1. Herbert schildt (2010), *The complete reference*, 7th edition, Tata Mc graw Hill, New Delhi

REFERENCE BOOKS:

1. T. Budd (2009), *An Introduction to Object Oriented Programming*, 3rd edition, Pearson Education, India.
2. J. Nino, F. A. Hosch (2002), *An Introduction to programming and OO design using Java*, John Wiley & sons.
3. Y. Daniel Liang (2010), *In*troduction *to Java programming*, 7th edition, Pearson education, India.
4. R. A. Johnson (2009), *An introduction to Java programming and object oriented application development*, 1st edition, Course Technology, India.

B. Tech. EEE V SEMESTER

INTEGRATED CIRCUITS APPLICATIONS
(Common to EEE & ECE)

Course Code: **A1415**

L	T	P	C
4	-	-	4

UNIT - I

INTEGRATED CIRCUITS AND OPERATIONAL AMPLIFIER: Introduction, Classification of IC's, IC chip size and circuit complexity, basic information of Op-Amp IC741 Op-Amp and its features, the ideal Operational amplifier, Op-Amp internal circuit, Op-Amp characteristics - DC and AC.

UNIT - II

LINEAR APPLICATIONS OF OP-AMP: Inverting and non-inverting amplifiers, adder, subtractor, Instrumentation amplifier, AC amplifier, V to I and I to V converters, Integrator and differentiator.

NON-LINEAR APPLICATIONS OF OP-AMP: Sample and Hold circuit, Log and Antilog amplifier, multiplier and divider, Comparators, Schmitt trigger, Multivibrators, Triangular and Square waveform generators, Oscillators.

UNIT - III

ACTIVE FILTERS: Introduction, Butterworth filters – 1st order, 2nd order low pass and high pass filters, band pass, band reject and allpass filters.

TIMER AND PHASE LOCKED LOOPS: Introduction to IC 555 timer, description of functional diagram, monostable and astable operations and applications, schmitt trigger, PLL - introduction, basic principle, phase detector/comparator, voltage controlled oscillator (IC 566), low pass filter, monolithic PLL and applications of PLL.

UNIT - IV

VOLTAGE REGULATOR: Introduction, Series Op-Amp regulator, IC Voltage Regulators, IC 723 general purpose regulators, Switching Regulator.

D to A AND A to D CONVERTERS: Introduction, basic DAC techniques - weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A to D converters - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications.

UNIT - V

CMOS LOGIC: CMOS logic levels, MOS transistors, Basic CMOS Inverter, NAND and NOR gates, CMOS AND-OR-INVERT and OR-AND-INVERT gates, implementation of any function using cmos logic.

COMBINATIONAL CIRCUITS USING TTL *74XX* ICS: Study of logic gates using *74XX* ICs, Four-bit parallel adder(IC 7483), Comparator(IC 7485), Decoder(IC 74138, IC 74154), BCD-to-7-segment decoder(IC 7447), Encoder(IC 74147), Multiplexer(IC 74151), Demultiplexer (IC 74154).

SEQUNTIAL CIRCUITS USING TTL *74XX* ICS: Flip Flops (IC 7474, IC 7473), Shift Registers, Universal Shift Register(IC 74194), 4- bit asynchronous binary counter(IC 7493).

TEXT BOOKS:

1. D. Roy Choudhury, Shail B. Jain (2012), *Linear Integrated Circuit*, 4th edition, New Age International Pvt. Ltd., New Delhi, India.
2. Ramakant A. Gayakwad, (2012), *OP-AMP and Linear Integrated Circuits*, 4th edition, Prentice Hall / Pearson Education, New Delhi.
3. Floyd, Jain (2009), *Digital Fundamentals,* 8th edition, Pearson Education, New Delhi.

REFERENCE BOOKS:

1. Sergio Franco (1997), *Design with operational amplifiers and analog integrated circuits*, McGraw Hill, New Delhi, India.
2. Gray, Meyer (1995), *Analysis and Design of Analog Integrated Circuits*, Wiley International, New Delhi.
3. John F. Wakerly (2007), *Digital Design Principles and practices*, Prentice Hall / Pearson Education, New Delhi.

B. Tech. EEE V SEMESTER

SIGNAL ANALYSIS AND TRANSFORM TECHNIQUES

Course Code: **A1419**

L	T	P	C
3	1	-	4

UNIT - I

CLASSIFICATION OF SIGNALS: Continuous time (CT) and Discrete time (DT) signals, Elementary signals: Unit, Step, Impulse, Ramp signals. Singularity Functions and Operations on signals.

FOURIER SERIES: Orthogonal functions, Relationship between Trigonometric Fourier series and Exponential Fourier series, Representation of periodic function by Fourier series over the entire interval, Convergence of Fourier series, Complex Fourier Spectrum, DFS representation of Periodic sequences, Computation of DFS, Properties of DFS.

UNIT - II

FOURIER TRANSFORMS: Fourier transform(FT), Fourier transform of standard signals, Properties of continuous Fourier transforms, Fourier transforms involving impulse function, Fourier transform of periodic signals, Fourier transform for discrete signals, discrete Fourier transforms: properties of DFT, linear convolution of sequences using DFT, computation of DFT.

UNIT - III

SIGNAL TRANSMISSION THROUGH LTI SYSTEMS: Classification of systems, discrete time LTI systems, Continuous time LTI systems, Properties of LTI system. Impulse response of a linear system, Filter Characteristics of LTI system, Distortion less transmission.

CONVOLUTION AND CORRELATION OF SIGNALS: System analysis by convolution, Graphical interpretation of convolution, Signal comparison, Relationship between Correlation and Convolution, Some properties of correlation function.

UNIT - IV

LAPLACE TRANSFORMS: The Laplace transform (LT), The Region of convergence (ROC) for Laplace transforms, Properties of Laplace transforms, Some Laplace transform pairs, Analysis and characterization of LTI system using Laplace transform. Inverse Laplace transforms. Laplace transforms methods in circuit analysis, The Transfer function.

UNIT - V

SAMPLING: Sampling of continuous time signals, sampling theorem, Reconstruction of signal from its samples, The Effect of under sampling: Aliasing.

Z -TRANSFORMS: The Z-Transform, The Region of Convergence(ROC) for Z transform and its properties, Properties of Z transform, Constraints on ROC for various classes of signals, Transfer function, Causality and stability, Inverse Z Transform using various methods, Relation between Z transform and DFS.

TEXT BOOKS:

1. A. V. Oppenheim, A. S. Willsky(2009), *Signals and Systems*, 2nd Edition, Prentice Hall of India, New Delhi.
2. B. P. Lathi(2001), *Signals, Systems & Communications,* BS Publications, New Delhi.
3. John G. Proakis, Dimitris G. Manolakis, D. Sharma (2010), *Digital Signal Processing Principles, Algorithms and Applications*, 3rd edition, Pearson education, India.

REFERENCE BOOKS:

1. Simon Haykin, Van Veen(2007), *Signals & Systems*, 2nd edition, Wiley Student Edition, New Delhi.
2. Hwei Piao Hsu (2003), *Schaum's Outline of Theory Problems of Signals and Systems*, McGraw-Hill professional, New Delhi, India.
3. Charles L. Phillips, John M. Parr, Eve A. Riskin(2007), *Signals, Systems and transforms,* Prentice Hall of India, New Delhi, India.

B. Tech. EEE V SEMESTER

POWER SYSTEM TRANSMISSION AND DISTRIBUTION

Course Code: **A1217**

L	T	P	C
4	-	-	4

UNIT - I

TRANSMISSION LINE PARAMETERS: Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT - II

PERFORMANCE OF SHORT, MEDIUM AND LONG LENGTH TRANSMISSION LINES: Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems. Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

UNIT - III

VARIOUS FACTORS GOVERNING THE PERFORMANCE OF TRANSMISSION LINE: Skin and Proximity effects - Description and effect on Resistance of Solid Conductors-Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line, Shunt Compensation. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

SAG AND TENSION CALCULATIONS: Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

UNIT - IV

OVERHEAD LINE INSULATORS AND UNDERGROUND CABLES: Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding. Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

UNIT - V

GENERAL ASPECTS OF AC & DC DISTRIBUTION SYSTEMS : Classification of Distribution Systems - Comparison of DC vs AC and Under-Ground vs Over - Head Distribution Systems- Requirements and Design features of Distribution Systems-Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

TEXT BOOKS:

1. C. L. Wadhwa (2011), *Electrical Power Systems*, 6th edition, New Age International (P) Limited, New Delhi.
2. M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A. Chakrabarti (2011), *A Text Book on Electrical Engineering*, 2nd edition, Dhanpat Rai & Co. Pvt. Ltd, New Delhi.

REFERENCE BOOKS:

1. B. R. Gupta (2008), *Power System Analysis and Design*, Revised Edition, S. Chand & Company Limited, New Delhi, India.
2. Hadi Saadat (2010), *Power System Analysis*, 3rd edition, Public Affairs Information Service, New Delhi.
3. I. J. Nagarat, D. P .Kothari(2006), *Modern Power System Analysis,* 3rd edition*,* Tata McGraw Hill Higher Education, New Delhi.

B. Tech. EEE V SEMESTER

AC MACHINES - II

Course Code: **A1218**

L	T	P	C
3	1	-	4

UNIT - I

CONSTRUCTION AND PRINCIPLE OF OPERATION: Constructional Features of round rotor and salient pole machines, Armature windings, Integral slot and fractional slot windings; Distributed and concentrated windings, pitch and winding factors E.M.F Equation. Synchronous Generator Characteristics, Harmonics in generated E.M.F., suppression of harmonics, armature reaction, leakage reactance, synchronous reactance and impedance, experimental determination, phasor diagram, load characteristics.

UNIT - II

REGULATION OF SYNCHRONOUS GENERATOR: Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods. Salient pole alternators, two reaction analysis, experimental determination of X_d and X_q (Slip test) Phasor diagrams, Regulation of salient pole alternators**.**

UNIT - III

PARALLEL OPERATION OF SYNCHRONOUS GENERATOR: Synchronizing alternators with infinite bus bars, synchronizing power torque, parallel operation and load sharing. Effect of change of excitation and mechanical power input, Analysis of short circuit current wave form. Determination of sub-transient, transient and steady state reactance's.

UNIT - IV

SYNCHRONOUS MOTORS: Theory of operation, phasor diagram, Variation of current and power factor with excitation, synchronous condenser, Mathematical analysis for power developed.

POWER CIRCLES: Excitation and power circles, hunting and its suppression, Methods of starting, synchronous induction motor.

UNIT - V

SINGLE PHASE MOTORS: Single phase Motors: Single phase induction motor, Constructional features-Double revolving field theory – Elementary idea of cross-field theory, split-phase motors, shaded pole motor.

SPECIAL MOTORS: Principle & performance of A.C. Series motor, Universal motor. Principle of permanent magnet and reluctance motors.

TEXT BOOKS:

1. I. J. Nagrath,D. P. Kothari (2005), Electric Machines, 7th edition, Tata Mc Graw Hill Education, New Delhi.
2. P. S. Bimbra (2011), Electrical Machinery, 7th edition, Khanna Publishers, New Delhi.

REFERENCE BOOKS:

1. M. G. Say (2006), Performance and Design of AC Machines, 3rd edition, BPB Publishers, New Delhi.
2. A. E. Fritzgerald, C. Kingsley, S. Umans (2002), Electric Machinery, 5th edition, Tata McGraw Hill Companies, New Delhi.
3. Langsdorf (2008), Theory of Alternating Current Machinery, 2nd edition, Tata McGraw Hill Companies, New Delhi.

B. Tech. EEE V SEMESTER

SOFT COMPUTING

Course Code: **A1541**

L	T	P	C
3	1	-	4

UNIT - I

BASICS OF ARTIFICIAL NEURAL NETWORK: Characteristics of Neural Networks, Structure and working of a biological neural network, artificial neural network: terminology, models of neurons: McCulloch Pitts model, Perceptron model, Adaline model, topology, Basic learning laws.

FUNCTIONAL UNITS FOR ANN FOR PATTERN RECOGNITION TASK: Pattern recognition problem, Basic functional units, PR by functional units.

UNIT - II

FEEDFORWARD NEURAL NETWORKS:

SUPERVISED LEARNING - I: Perceptrons - Learning and memory, Learning algorithms, Error correction and gradient decent rules, Perceptron learning algorithms.

SUPERVISED LEARNING - II: Backpropogation, Multilayered network architectures, Back propagation learning algorithm, Example applications of feed forward neural networks.

UNIT - III

FEEDBACK NEURAL NETWORKS & SELF ORGANIZING FEATURE MAP: Introduction, Associative learning, Hopfield network, Error performance in Hopfield networks, simulated annealing, Boltzmann machine and Boltzmann learning, state transition diagram and false minima problem, stochastic update, simulated annealing, Boltzmann machine, bidirectional associative memory, bam stability analysis. Self organization, generalized learning laws, competitive learning, vector quantization, self organizing feature map, applications of self organizing feature map.

UNIT - IV

FUZZY LOGIC: Fuzzy set theory, crisp sets, operations on crisp set, fuzzy sets, fuzzy versus crisp, operations, fuzzy relations, crisp relations, properties. Fuzzy logic Application: Fuzzy Control of Blood Pressure.

UNIT - V

FUZZY LOGIC IN DATABASE AND INFORMATION SYSTEMS: Fuzzy Information, Fuzzy Logic in database Systems, Fuzzy Relational data Models, operations in Fuzzy Relational data Models, Design theory for Fuzzy Relational databases, Fuzzy information Retrieval and Web search, Fuzzy Object Oriented databases.

GENETIC ALGORITHMS: Introduction to Genetic Algorithms, Evolutionary Algorithms.

TEXT BOOKS:

1. Satish Kumar (2004), *Neural Networks A classroom Approach*, Tata McGraw Hill Publication, New Delhi.
2. Lotfi A. Zadeh(1997), *Soft computing and Fuzzy Logic*, World Scientific Publishing Co., Inc. River Edge, NJ, USA.

REFERENCE BOOKS:

1. B. Yegnanarayana (2006), *Artificial Neural Networks*, Prentice Hall of India, New Delhi, India.
2. John Yen, Reza Langari(2006), *Fuzzy Logic*, Pearson Education, New Delhi, India.
3. S. Rajasekaran, Vijaylakshmi Pari (2003), *Neural networks, Fuzzy Logic and Genetic Algorithms Synthesis and Applications*, Prentice Hall of India, New Delhi, India.

B. Tech. EEE V SEMESTER

AC MACHINES LAB

Course Code: **A1219**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. O.C. & S.C. Tests on Single phase Transformer.
2. Sumpner's test on a pair of single phase transformers.
3. Scott connection of transformers.
4. No-load & Blocked rotor tests on three phase Induction motor.
5. Regulation of a three phase alternator by synchronous impedance method.
6. V and Inverted V curves of a three phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor.
8. Determination of X_d and X_q of a salient pole synchronous machine.
9. Separation of core losses of a single phase transformer.
10. Brake test on a three phase induction motor.
11. Synchronization of alternators.
12. Determination of sequence impedances of an alternator.

B. Tech. EEE V SEMESTER

ELECTRONIC CIRCUITS AND INTEGRATED CIRCUITS LAB

Course Code: **A1422**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS: (Minimum 12 Experiments to be conducted)

PART - A:
ELECTRONIC CIRCUITS

1. Common Emitter Amplifier.
2. Two Stage RC Coupled Amplifier.
3. Voltage Series Feedback Amplifier.
4. Current Shunt Feedback Amplifier.
5. Class A Power Amplifier (With and Without Transformer Load).
6. Class B Complementary Symmetry Push Pull Amplifier.
7. Hartley and Colpitt's Oscillator
8. RC Phase Shift Oscillator.

PART - B:
IC APPLICATIONS

1. Measurement of IC741 op-amp parameters.
2. Basic applications of IC741 op-amp.
3. Adder, Subtractor, Comparator using IC 741 Op-Amp.
4. Integrator and differentiator using IC741 op-amp.
5. IC 555 timer in Astable and Monostable operation.
6. Schmitt trigger circuits using IC 741 op-amp & IC 555 timer.
7. Operation of phase locked loop using IC565.
8. Voltage regulator IC 723, three terminal voltage regulators- 7805, 7809, 7912.

SYLLABI FOR VI SEMESTER

B. Tech. EEE VI SEMESTER

INDUSTRIAL MANAGEMENT AND PSYCHOLOGY
(Common to EEE, ME & CE)

Course Code: **A1015**

L	T	P	C
4	-	-	4

UNIT - I

CONCEPTS OF MANAGEMENT AND ORGANISATION: Functions of management, evolution of management thought, Taylor's scientific management, fayol's principles of management, Hertzberg's Maslow's hierarchy of human needs, systems approach to management.

DESIGNING ORGANISATIONAL STRUCTURES: Basic concepts related to organisation - departmentation and decentralization, types of mechanistic and organic structures of organisation (line organization, line and staff organization, functional organization.

UNIT - II

PLANT LOCATION: Definition, factors affecting the plant location, comparison of rural and urban sites, methods for selection of plant- matrix approach. Plant layout - definition, objectives, types of production, types of plant layout, various data analyzing forms travel chart.

WORK STUDY: Definition, objectives, method study - definition, objectives, steps involved- various types of associated charts, difference between micromotion and memomotion studies. Work measurement- definition, time study, steps involved, equipment, different methods of performance rating, allowances, standard time calculation. Work Sampling - definition, steps involved, standard time calculations, differences with time study.

UNIT - III

INTRODUCTION TO PERT / CPM : Project management, network modeling-probabilistic model, various types of activity times estimation, programme evaluation review techniques, critical path, probability of completing the project, deterministic model, critical path method (CPM), critical path calculation, crashing of simple of networks.

INSPECTION AND QUALITY CONTROL: Types of inspections, statistical quality control, techniques, variables and attributes, assignable and non assignable causes, variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan, single sampling and double sampling plans, OC curves. Introduction to TQM - quality circles, ISO 9000 series procedures.

UNIT - IV

MATERIALS MANAGEMENT: Objectives, inventory functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory control systems, continuous review system, periodical review system. Stores management and stores records. Purchase management, duties of purchase of manager, associated forms.

INTRODUCTION TO HUMAN RESOURCE MANAGEMENT: Functions of HRM, job evaluation, different types of evaluation methods. Job description, merit rating, difference with job evaluation, different methods of merit ratings, wage incentives, different types of wage incentive schemes. Marketing, marketing vs. selling, marketing mix, product life cycle.

UNIT - V

INDUSTRIAL PSYCHOLOGY: Definition and concept, industrial psychology vs. personnel management, aims and objectives of industrial psychology, scope of industrial psychology, individual and group, individual differences in behavior, group dynamics, theory x and y, Hawthorne experiment, morale, motivation, working environmental conditions, industrial fatigue.

TEXT BOOKS:

1. O. P. Khanna (2004), *Industrial Engineering and Management*, Dhanpat Rai, New Delhi.

REFERENCE BOOKS:

1. Stoner, Freeman (2005), *Gilbert, Management*, 6th edition, Pearson Education, New Delhi.
2. Panner Selvam (2004), *Production and Operations Management*, Prentice Hall of India, New Delhi.
3. Ralph M. Barnes (2004), *Motion and Time Studies*, John Wiley and Sons.
4. L. S. Srinath (2000), *PERT / CPM*, affiliate East-West Press, New Delhi.
5. Gary Dessler (2002), *Human Resource Management*, Pearson Education Asia, India.

B. Tech. EEE VI SEMESTER

MICRO PROCESSORS AND INTERFACING
(Common to EEE & ECE)

Course Code: **A1423**

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION: Architecture of 8086 microprocessor, Register organization, 8086 flag register and its functions, addressing modes of 8086, Pin diagram of 8086, Minimum mode system operation, Timing diagram.

UNIT - II

8086 FAMILY ASSEMBLY LANGUAGE PROGRAMMING: 8086 Instruction Set, Simple programs, Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation, assembler directives, procedures and macros.

UNIT - III

8086 MEMORY AND DIGITAL INTERFACING: 8086 addressing and address decoding, Interfacing RAM, ROM, EPROM to 8086, 8255 programmable Peripheral Interface, various modes of operation and interfacing to 8086, Interfacing keyboard, Interfacing to Alphanumeric Displays, seven segment LED displays, stepper motor, D/A and A/D converter interfacing.

UNIT - IV

INTERRUPTS AND PROGRAMMABLE INTERRUPT CONTROLLERS: 8086 Interrupts and Interrupt Responses introduction to DOS and BIOS interrupts. 8259A Priority Interrupt Controller, Software Interrupt Applications.

The 8086 Maximum Mode, Direct Memory Access (DMA) Data Transfer, Interfacing and Refreshing Dynamic RAMs, 8254 Software-Programmable Timer/Counter.

UNIT - V

SERIAL DATA TRANSFER SCHEMES: Asynchronous and synchronous data transfer schemes, 8251 USART architecture and interfacing, RS - 232C Serial data standard, RS - 423A and RS - 422A, sample program of serial data transfer.

ADVANCED MICROPROCESSORS: Introduction to 80286, salient features of 80386, real and protected mode segmentation and paging.

TEXT BOOKS:

1. Douglas V. Hall (2007), *Microprocessors Interface*, 2nd edition, Tata McGraw Hill, New Delhi.

REFERENCE BOOKS:

1. Walter A. Triebel, Avtar Singh (2003), *The 8088 and 8086 Microprocessors* 4th edition, Prentice Hall of India, New Delhi.
2. Mazidi (2000), *The 8051 Microcontroller and Embedded System*, Prentice Hall of India, New Delhi.
3. Deshmukh (2004), *Microcontrollers*, Tata McGraw Hill Edition, New Delhi.

B. Tech. EEE VI SEMESTER

COMPUTER METHODS IN POWER SYSTEMS

Subject Code: **A1220**

L	T	P	C
4	-	-	4

UNIT - I

PER-UNIT SYSTEM OF REPRESENTATION: Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems. Bus Incidence Matrix, Y_{bus} formation by Direct and Singular Transformation Methods, Numerical Problems**.**

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 (Derivations and Numerical Problems without mutual coupling)

UNIT - II

POWER FLOW ANALYSIS - I: Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations – Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only).

UNIT - III

POWER FLOW ANALYSIS - II: Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution with or without PV Busses- Derivation of Jacobian Elements. Decoupled and Fast Decoupled Methods.- Comparison of Different Methods – DC load Flow.

SHORT CIRCUIT ANALYSIS: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems (Symmetrical fault Analysis).

UNIT - IV

UNBALANCED FAULT ANALYSIS: Symmetrical Component Transformation, Positive, Negative and Zero sequence components (Voltages, Currents and Impedances) and networks, Numerical Problems. LG, LL, LLG faults with and without fault impedance, Numerical Problems.

POWER SYSTEM STEADY STATE STABILITY ANALYSIS: Elementary concepts of Steady State, Dynamic and Transient Stabilities. Description of Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

UNIT - V

POWER SYSTEM TRANSIENT STATE STABILITY ANALYSIS: Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation.- Solution of Swing Equation: Point-by-Point Method. Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

TEXT BOOKS:

1. G. W. Stagg, A. H. El-Abiad (2008), *Computer Methods in power System Analysis*, 2nd edition, Tata McGraw Hill Publications, New Delhi.
2. M. A. Pai (2008), *Computer Techniques in Power System Analysis*, 2nd edition, Tata McGraw Hill Publications, New Delhi, India.

REFERENCE BOOKS:

1. Hadi Saadat (2007), *Power System Analysis*, 5th edition, Tata McGraw Hill Publications, New Delhi.
2. I. J. Nagrath, D. P. Kothari (2005), *Modern Power system Analysis*, 3rd edition, Tata McGraw Hill Publications, New Delhi, India.

B. Tech. EEE VI SEMESTER

ELECTRICAL MEASUREMENTS

Course Code: **A1221**

L	T	P	C
3	1	-	4

UNIT - I

MEASURING INSTRUMENTS: Classification - deflecting, control and damping torques - Ammeters and Voltmeters - PMMC, moving iron type instruments - expression for the deflecting torque and control torque - Errors and compensations, extension of range using shunts and series resistance**.** Electrostatic Voltmeters-electrometer type and attracted disc type - Extension of range of E.S. Voltmeters.

INSTRUMENT TRANSFORMERS: Current Transformer and Potential Transformer, Ratio and phase angle errors.

POWER FACTOR METERS: Type of Power Factor Meters, dynamometer and moving iron type 1-ph and 3-ph meters.

UNIT - II

MEASUREMENT OF POWER: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques - Extension of range of wattmeter using instrument transformers - Measurement of active and reactive powers in balanced and unbalanced systems.

MEASUREMENT OF ENERGY: Single phase induction type energy meter - driving and braking torques - errors and compensations - testing by phantom loading using R.S.S. meter. Three phase energy meter, trivector meter, maximum demand meters.

MEASUREMENT OF FREQUENCY: Frequency meters - Resonance type and Weston type, Synchroscopes.

UNIT - III

D.C POTENTIOMETERS: Principle and operation of D.C. Crompton's potentiometer, standardization. Measurement of unknown resistance, current, voltage.

A.C. POTENTIOMETERS: Polar and coordinate type standardization, applications.

UNIT - IV

RESISTANCE MEASUREMENTS: Method of measuring low, medium and high resistance Wheatstone's bridge. Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance, loss of charge method.

UNIT - V

A.C. BRIDGE: Measurement of inductance, Quality Factor, Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle, Desauty Bridge. Wien's bridge, Schering Bridge.

MAGNETIC MEASUREMENTS: Ballistic galvanometer, equation of motion, flux meter.

DIGITAL VOLTMETERS: Digital voltmeters-Successive approximation, ramp and dual-Slope integration continuous balance type-Micro processor based ramp type DVM digital frequency meter-digital phase angle meter.

TEXT BOOKS:

1. A. K. Sawhney (2011), A Course in Electrical & Electronic Measurement & Instruments, 19th edition, Dhanpat Rai & Co. Publications, New Delhi.
2. E. W. Golding, F. C. Widdis(2010), Electrical Measurements and Measuring Instruments, 5th edition, Wheeler Publishing, New Delhi.

REFERENCE BOOKS:

1. J. B. Gupta (2010), Electronics and Electrical Measurements and Instrumentation, 10th edition, S. K. Kataria sons, New Delhi.
2. Reissland, Martin. U (2010), Electrical Measurements: Fundamentals, Concepts, Applications, New Age International (P) Limited, New Delhi.

B. Tech. EEE VI SEMESTER

POWER ELECTRONICS

Course Code: **A1222**

L	T	P	C
3	1	-	4

UNIT - I

POWER SEMI CONDUCTOR DEVICES AND COMMUTATION CIRCUITS: Thyristors - silicon controlled rectifiers (SCR's), BJT, power MOSFET, power IGBT and their characteristics, other thyristors. Basic theory of operation of SCR, static characteristics, turn on and turn off methods, dynamic characteristics of SCR, turn on and turn off times, salient points, two transistor analogy, SCR UJT firing circuit, series and parallel connections of SCR's, snubber circuit details, specifications and ratings of SCR's, BJT, IGBT numerical problems, line commutation and forced commutation circuits.

UNIT - II

SINGLE PHASE CONTROLLED CONVERTERS: Phase control technique, single phase line commutated converters, midpoint and bridge connections, half controlled converters, fully controlled converters with resistive, RL loads and RLE load, derivation of average load voltage and current line commutated inverters, active and reactive power inputs to the converters without and with freewheeling diode. Effect of source inductance, derivation of load voltage and current, numerical problems.

UNIT - III

THREE PHASE LINE COMMUTATED CONVERTERS: Three phase converters, three pulse and six pulse converters, midpoint and bridge connections average load voltage with R and RL loads, effect of source inductance, dual converters (both single phase and three phase), waveforms, numerical problems.

AC VOLTAGE CONTROLLERS: AC voltage controllers, single phase two SCR's in anti parallel with R and RL loads, modes of operation of Triac, Triac with R and RL loads, derivation of RMS load voltage, current and power factor wave forms, firing circuits, numerical problems.

UNIT - IV

CYCLO CONVERTERS: Cyclo converters, single phase midpoint cyclo converters with resistive and inductive load (principle of operation only), bridge configuration of single phase cyclo converter (principle of operation only), waveforms.

CHOPPERS: Time ratio control and current limit control strategies, step down choppers derivation of load voltage and currents with R, RL and RLE loads, step up chopper, load voltage expression. Morgan's chopper, jones chopper and oscillation chopper (principle of operation only) waveforms, AC chopper, problems.

UNIT - V

INVERTERS: Inverters, single phase inverter, basic series inverter, basic parallel capacitor inverter bridge inverter, waveforms, simple forced commutation circuits for bridge inverters, MC Murray and MC Murray, bedford inverters, voltage control techniques for inverters pulse width modulation techniques, numerical problems.

TEXT BOOKS:

1. M. D. Singh, K. B. Kanchandhani (2008), *Power Electronics*, 3rd edition, Tata Mc graw hill publishing company, New Delhi, India.
2. M. H. Rashid (1998), *Power Electronics: Circuits, Devices and Applications*, 3rd edition, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. Vedam Subramanyam (1997), *Power Electronics*, New Age International (P) Limited, New Delhi.
2. V. R. Murthy (2005), *Power Electronics,* 1st edition, Oxford University Press, New Delhi.
3. P. C. Sen(2001), *Power Electronics*, 30th edition, Tata Mc Graw Hill Publishing, New Delhi.

B. Tech. EEE VI SEMESTER

DATABASE MANAGEMENT SYSTEMS

Interdepartmental Elective - I

(Common to EEE & ME)

Course Code: **A1511**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION: History of database systems, introduction to database management systems, database system applications, database systems versus file systems, view of data, data models, database languages- DDL & DML commands and examples of basic SQL queries, database users and administrators, transaction management, database system structure, application architectures.

DATABASE DESIGN: Introduction to database design and E-R diagrams, entities, attributes and entity sets, relationships and relationship sets, additional features of the E-R model, conceptual design with the E-R model, conceptual design for large enterprises.

UNIT - II

THE RELATIONAL MODEL: Introduction to the relational model, integrity constraints over relations, enforcing integrity constraints, querying relational data, logical database design: E-R to relational, introduction to views, destroying/altering tables and views.

RELATIONAL ALGEBRA AND CALCULUS: Preliminaries, relational algebra operators, relational calculus - tuple and domain relational calculus, expressive power of algebra and calculus.

SQL: Overview, the form of a basic SQL query, union, intersect and except operators, nested queries, aggregate operators, null values, complex integrity constraints in SQL, triggers and active databases, designing active databases.

UNIT - III

SCHEMA REFINEMENT AND NORMAL FORMS: Introduction to schema refinement, functional dependencies, reasoning about FDs. Normal forms: 1NF, 2NF, 3NF, BCNF, properties of decompositions, normalization, schema refinement in database design, other kinds of dependencies: 4NF, 5NF, DKNF, case studies.

UNIT - IV

TRANSACTIONS MANAGEMENT: Transaction concept, transaction state, implementation of atomicity and durability, concurrent executions, serializability, recoverability, implementation of isolation, transaction definition in SQL, testing for serializability.

CONCURRENCY CONTROL AND RECOVERY SYSTEM: Concurrency control - lock based protocols, time-stamp based protocols, validation based protocols, multiple granularity, and deadlock handling. Recovery system - failure classification, storage structure, recovery and atomicity, log-based recovery, shadow paging, recovery with concurrent transactions, buffer management, failure with loss of non-volatile storage, advanced recovery techniques, remote backup systems.

UNIT - V

OVERVIEW OF STORAGE AND INDEXING: Data on external storage, file organizations and indexing, index data structures, comparison of file organizations, indexes and performance tuning. Tree structured indexing - intuition for tree indexes, indexed sequential access method (ISAM), B+ Trees - a dynamic tree structure.

IBM DB2 FUNDAMENTALS*: DB2 product family - versions and editions, DB2 database and its objects, DB2 pure XML, backup and recovery, concurrency and its isolation levels, working with SQL, DB2 programming fundamentals - UDF, stored procedures.

** This topic is designed in collaboration with IBM India Private Limited.*

TEXT BOOKS:

1. Raghurama Krishnan, Johannes Gehrke (2007), *Database Management Systems*, 3rd edition, Tata McGraw Hill, New Delhi, India.

REFERENCE BOOKS:

1. Elmasri Navate (1994), *Fundamentals of Database Systems*, Pearson Education, India.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan (2005), *Database System Concepts,* 5th edition, McGraw-Hill, New Delhi, India.
3. Peter Rob, Carlos Coronel (2009), *Database Systems Design, Implementation and Management*, 7th edition, India.

B. Tech. EEE VI SEMESTER

WIRELESS AND MOBILE COMPUTING

(Interdepartmental Elective - I)

Course Code: **A1606**

L	T	P	C
4	-	-	4

UNIT - I

SATIELLITE SYSTEM: History, Applications, Routing, Localization, Handover.

WIRELESS LAN: Infrared vs. radio transmission, infrastructure and ad hoc networks, IEEE 802.11.

HIPER LAN: Protocol architecture, physical layer, channel access control sub-layer, MAC sub-layer, information bases and networking.

UNIT - II

MOBILE COMPUTING: Introduction, history, architecture, devices and applications, limitations.

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS (GSM): Mobile services, system architecture, radio interface, protocols, localization and calling, handover, security, and new data services.

MEDIUM ACCESS CONTROL: Motivation for a specialized MAC (Hidden and exposed terminals, near and far terminals), SDMA, FDMA, TDMA, CDMA.

UNIT - III

MOBILE NETWORK LAYER: Mobile IP (goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), dynamic host configuration protocol (DHCP).

MOBILE ADHOC NETWORKS (MANETS): Overview, properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

MOBILE TRANSPORT LAYER: Traditional TCP, indirect TCP, snooping TCP, mobile TCP, fast retransmit/ fast recovery, transmission /time-out freezing, selective retransmission, transaction oriented TCP.

UNIT - IV

DATA DISSEMINATION: Push based mechanisms, pull based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

DATABASE ISSUES: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

UNIT - V

PROTOCOLS AND TOOLS: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (user scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

TEXT BOOKS:

1. Jochen Schiller (2004), *Mobile Communications*, 2nd edition, Low price edition, Pearson Education, New Delhi.
2. Rajkamal (2007), *Mobile Computing*, 2nd edition, Oxford University Press, USA.

REFERENCE BOOKS:

1. Stojmenovic, Cacute(2002), *Handbook of Wireless Networks and Mobile Computing,* John Wiley, New York.
2. Hansmann, Merk, Nicklous, Stober(2003), *Principles of Mobile Computing*, 2nd edition, Springer, New Delhi.

B. Tech. EEE VI SEMESTER

VLSI DESIGN

(Interdepartmental Elective - I)

Course Code: **A1429**

L	T	P	C
4	-	-	4

UNIT - I

MOS TRANSISTOR THEORY: Introduction, MOS Device Design Equations–Threshold Voltage-Body Effect, Channel Length Modulation, MOS Models, the Complementary CMOS Inverter-DC characteristics, the differential inverter, the Tristate inverter, Bipolar devices.

UNIT - II

CMOS PROCESSING TECHNOLOGY: Overview-Wafer Processing, Oxidation, Epitaxy, deposition, ion-implantation and diffusion, the silicon gate process, Basic CMOS technology, Latchup – Origin of Latchup, Latchup triggering, Latchup prevention.

UNIT - III

MOS-CIRCUIT DESIGN PROCESSES: MOS Layers, Stick Diagrams-nMOS Design style, CMOS design style, Design Rules and Layout-Lambda based design rules, contact cuts, double metal MOS process rules, CMOS Lambda based design rules, general observations on design rules, 2 µm Double metal Double poly CMOS rules, Layout Diagrams.

CIRCUIT CHARACTERIZATION: Introduction, Resistance Estimation, Capacitance Estimation, Inductance, Switching Characteristics-analytic delay models, Power Dissipation, Scaling of MOS Transistor Dimensions.

UNIT - IV

CMOS CIRCUIT DESIGN AND LOGIC DESIGN: Introduction, CMOS logic gate design, Basic Physical design of simple logic gates, CMOS logic structures-CMOS complementary logic, Pseudo-nMOS logic, Dynamic CMOS logic, Pass transistor Logic, CMOS Domino Logic.

UNIT - V

CMOS TESTING: Need for Testing, Manufacturing Test Principles-fault models, Observability, Controllability, Design Strategies for Test, Chip Level test Techniques.

TEXT BOOKS:

1. Neil H. E. Weste, Kamran Eshraghian (2001), *Principles of CMOS VLSI Design – A System Perspective*, 2nd Edition, Pearson Education Asia, India.
2. Kamran Eshraghian, Dougles A. Pucknell, Sholeh Eshraghian (2005)*, Essentials of VLSI Circuits and Systems*, PHI, New Delhi.

REFERENCE BOOKS:

1. John .P. Uyemura (2011), *Introduction to VLSI Circuits and Systems,* John Wiley, India.
2. S.M. Sze (2003), *VLSI Technology,* 2nd Edition, Tata McGraw Hill, New Delhi.

B. Tech. EEE VI SEMESTER

ROBOTICS

Interdepartmental Elective - I

(Common to EEE & AE)

Course Code: **A1337**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION: Automation and Robotics, CAD/CAM and Robotics, an over view of Robotics, present and future applications – classification by coordinate system and control system.

COMPONENTS OF THE INDUSTRIAL ROBOTICS: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT - II

MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation, problems.

MANIPULATOR KINEMATICS: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT - III

MANIPULATOR DYNAMICS - I: Differential transformation and manipulators, Jacobians, problems. Dynamics: Lagrange, Euler and Newton, Euler formations, Problems.

MANIPULATOR DYNAMICS - II: Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion, straight line motion, Robot programming, languages and software packages.

UNIT - IV

ROBOT ACTUATORS AND FEEDBACK COMPONENTS: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors. Feedback components: position sensors, potentiometers, resolvers, encoders, Velocity sensors.

UNIT - V

ROBOT APPLICATION IN MANUFACTURING: Material Transfer, Material handling, loading and unloading, Processing spot and continuous arc welding & spray painting, Assembly and Inspection.

TEXT BOOKS:

1. M. P. Groover (2010), *Industrial Robotics*, 3rd edition, Pearson Education, New Delhi.
2. K.S. Fu (2010), *Robotics*, 1st edition, Tata Mc Graw Hill Publishing Company Ltd., New Delhi.

REFERENCE BOOKS:

1. R.K. Mittal, I. J. Nagrath (2012), *Robotics and Control*, 1st edition, Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
2. P. Coiffet, M. Chaironze (2010), *An Introduction to Robot Technology*, 3rd edition, Kogam Page Ltd., London.
3. Richard D. Klafter(2010), *Robotic Engineering*, 2nd edition, Prentice Hall of India, New Delhi.

B. Tech. EEE VI SEMESTER

INTRODUCTION TO AIRCRAFT INDUSTRY

(Interdepartmental Elective - I)

Course Code: **A1701**

L	T	P	C
4	-	-	4

This Course is Designed in Collaboration with Infosys Technologies Limited.

UNIT - I

AIRCRAFT INDUSTRY OVERVIEW: Evolution and History of Flight, Types Of Aerospace Industry, Introduction to ages of engineering, Aerospace Manufacturing, Introduction to the space environment & human space exploration.

UNIT - II

INTRODUCTION TO AIRCRAFTS, DURATION: Basic components of an Aircraft, Structural members, Aircraft Axis System, Aircraft Motions, Control surfaces and High lift Device. Types of Aircrafts - Lighter than Air/Heavier than Air Aircrafts Conventional Design Configurations based on Power Plant Location, Wing vertical location, intake location, Tail Unit Arrangements, Landing Gear Arrangements. Unconventional Configurations-Biplane, Variable Sweep, Canard Layout, Twin Boom Layouts, Span loaders, Blended Body Wing Layout, STOL and STOVL Aircraft, Stealth Aircraft. Advantages and disadvantages of these Configurations.

UNIT - III

INTRODUCTION TO AIRCRAFT SYSTEMs: Types of Aircraft Systems, Mechanical Systems, Electrical and Electronic Systems, Auxiliary systems. ***Mechanical Systems***: Environmental control systems (ECS), Pneumatic systems, Hydraulic systems, Fuel systems, Landing gear systems, Engine Control Systems, Ice and rain protection systems, Cabin Pressurization and Air Conditioning Systems, Steering and Brakes Systems Auxiliary Power Unit. ***Electrical systems:*** Avionics, Flight controls, Autopilot and Flight Management Systems, Navigation Systems, Communication, Information systems, Radar System.

UNIT - IV

BASIC PRINCIPLES OF FLIGHT: Significance of speed of Sound, Air speed and Ground Speed, Properties of Atmosphere, Bernoulli's Equation, Forces on the airplane, Airflow over wing section, Pressure Distribution over a wing section, Generation of Lift, Drag, Pitching moments, Types of Drag, Lift curve, Drag Curve, Lift/Drag Ratio Curve, Factors affecting Lift and Drag, Center of Pressure and its effects. Aerofoil Nomenclature, Types of Aerofoil, Wing Section- Aerodynamic Center, Aspect Ratio, Effects of lift, Drag, speed, Air density on drag.

UNIT - V

BASICS OF FLIGHT MECHANICS: Mach Waves, Mach Angles, Sonic and Supersonic Flight and its effects.

STABILITY AND CONTROL: Degree of Stability- Lateral, Longitudinal and Directional Stability and controls of Aircraft. Effects of Flaps and Slats on Lift Coefficients, Control Tabs, Stalling, Landing, Gliding Turning, Speed of Sound, Mach Numbers and Shock Waves.

AIRCRAFT PERFORMANCE AND MANEUVERS: Power Curves, Maximum and minimum speeds of horizontal flight, Effects of Changes of Engine Power, Effects of Altitude on Power Curves, Forces acting on a Aeroplane during a Turn, Loads during a Turn, Correct and incorrect Angles of Bank, Aerobatics, Inverted Maneuvers, Maneuverability

TEXT BOOKS:

1. Anderson J. D. (2012), *Introduction to Flight*, 7th edition, McGraw Hill, New Delhi.
2. Shevell (2004), *Fundamentals of Flight*, 2nd edition, Pearson Education Limited, India.
3. Allan Seabridge, Ian Moir (2008), *Aircraft Systems: Mechanical, Electrical and Avionics Subsystems Integration,* 3rd edition, John Willey & Sons, New Delhi, India.

REFERENCES BOOKS:

1. A.C Kermode (2012), *Mechanics of Flight*, 12th edition, Pearson Education Limited, India.
2. Kermode, A.C. (1989), *Flight without Formulae*, 5th edition, Pearson Education Limited, India.

B. Tech. EEE VI SEMESTER

AIR POLLLUTION AND CONTROL METHODOLOGIES

Interdepartmental Elective - I

(Common to EEE, ME & AE)

Course Code: **A1148**

L	T	P	C
4	-	-	4

UNIT - I

AIR POLLUTION: Definitions, scope, significance and episodes, air pollutants – classifications - natural and artificial - primary and secondary, point and non- point, line and areal sources of air pollution- stationary and mobile sources. Effects of air pollutants on man, material and vegetation: global effects of air pollution - green house effect, heat islands, acid rains, ozone holes etc.

UNIT - II

THERMODYNAMICS AND KINETICS OF AIR - POLLUTION: Applications in the removal of gases like SOx, NOx, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion. Meteorology and plume Dispersion,

UNIT - III

PROPERTIES OF ATMOSPHERE: Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

LAPSE RATES: Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion.

UNIT - IV

CONTROL OF PARTICULATES: Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators. General Methods of Control of NOx and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

UNIT - V

AIR QUALITY MANAGEMENT: Monitoring of SPM, SO; NO and CO Emission Standards.

TEXT BOOKS:

1. M. N. Rao, H. V. N. Rao (1988), *Air pollution*, Tata McGraw Hill Education, New Delhi, India.
2. C. S. Rao (2006), *Environmental Pollution control Engineering*, New age international, New Delhi, India.

REFERENCE BOOKS:

1. R. K. Trivedy, P.K. Goel (2003), *Introduction to Air pollution*, ABD Publications, New Delhi, India.
2. Wark, Warner (1998), *Air pollution its origin and control,* Addison-Wesley, New York.

B. Tech. EEE VI SEMESTER

MICRO PROCESSORS AND INTERFACING LAB

(Common to EEE & ECE)

Course Code: **A1427**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

I. MICROPROCESSOR 8086:

1. Programs involving data Transfer Instructions
   a. Byte and word transfer in different addressing modes
   b. Block move Without overlapping
   c. Block move With overlapping
   d. Block interchanging

2. Programs involving arithmetic and logical operations like addition and subtraction of multi precision numbers
   a. Addition and Subtraction of Multi precision numbers
   b. Multiplication and division of signed and unsigned Hexadecimal numbers
   c. ASCII adjustment instructions
   d. Code Conversion
   e. Arithmetic program to find square ,cube ,LCM ,GCD and factorial

3. Programs involving bit manipulation instructions like checking
   a. If given data is positive or negative
   b. If given data is odd or even
   c. Logical ones and zeros in a given data
   d. 2 out of 5 code
   e. Bit wise palindrome
   f. Nibble wise palindrome

4. Programs involving Branch / Loop instructions like :
   a. Programs on arrays : addition/subtraction of N nos., finding largest/smallest no., ascending/descending order, etc.
   b. Near and Far Conditional and Unconditional jumps, Calls and Returns

5. Programs on String Manipulations like string transfer, string reversing, searching for a character in a string, palindrome etc.

6. Programs involving on Software Interrupts

7. Programs to use DOS interrupt INT 21H Function calls For:
   a. Reading a Character from Keyboard, Buffer Keyboard input
   b. Display of characters/String on console
   c. Creation of a new file, read/write from a file,
   d. Read system date, set system date, read system time, set system time

II. INTERFACING 8086:

1. Experiments on interfacing 8086 with the following modules through 8255 PPI / 8257 DMA / 8259 PIC
   a. A/D and D/A converters
   b. Matrix keyboard interface
   c. Seven segment display interface
   d. Logical controller interface
   e. Stepper motor interface
   f. Traffic signals by interfacing traffic controller to 8086
   g. Real time Clock using PIT 8253/8254

2. Interfacing a printer to an 8086 Microcomputer kit

B. Tech. EEE VI SEMESTER

POWER ELECTRONICS AND SIMULATION LAB

Course Code: **A1223**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. Study of Characteristics of SCR, MOSFET & IGBT
2. DC Jone's Chopper.
3. Single Phase AC Voltage Controller with R and RL Loads.
4. Single Phase Half & fully controlled bridge converter with R and RL loads.
5. Single Phase Cyclo converter with R and RL loads.
6. Single Phase series inverter with R and RL loads.
7. Simulation of single-phase full converter with RLE load.
8. Simulation of single-phase AC voltage controller with RLE load.
9. Simulation of three phase full converter with RLE load.
10. Simulation of Buck chopper.
11. Simulation of single phase PWM inverter.
12. Simulation of three phase Half converter.

SYLLABI FOR VII SEMESTER

B. Tech. EEE VII SEMESTER

EMBEDDED SYSTEMS
(Common to EEE & ECE)

Course Code: **A1430**

L	T	P	C
4	-	-	4

UNIT - I

EMBEDDED COMPUTING: Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples.

UNIT - II

THE 8051 ARCHITECTURE: Introduction, 8051 micro controller hardware, input/output ports and circuits, external memory, counter and timers, serial data input/output, interrupts.

BASIC ASSEMBLY LANGUAGE PROGRAMMING CONCEPTS: The assembly language programming process, programming tools and techniques, programming the 8051. Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions.

UNIT - III

INTRODUCTION TO REAL-TIME OPERATING SYSTEMS: Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

BASIC DESIGN USING A REAL-TIME OPERATING SYSTEM: Principles, semaphores and queues, hard real-time scheduling considerations, saving memory and power, an example RTOS like uC-OS (open source).

UNIT - IV

EMBEDDED SOFTWARE DEVELOPMENT TOOLS: Host and target machines, linker/locators for embedded software, getting embedded software into the target system

DEBUGGING TECHNIQUES: Testing on host machine, using laboratory tools, an example system.

UNIT - V

INTRODUCTION TO ADVANCED ARCHITECTURES: ARM and SHARC, processor and memory organization and instruction level parallelism; networked embedded systems: bus protocols, I^2C bus and CAN bus; internet-enabled systems, design example-elevator controller.

TEXT BOOKS:

1. Wayne Wolf (2008), *Computers as Components-principles of embedded computer system design*, Elsevier, New Delhi, India.
2. Kenneth J. Ayala (2008), *The 8051 Microcontroller*, 3rd edition, Cengage Learning, India.
3. David E. Simon (1999), *An Embedded Software Primer*, Pearson Education, India.

REFERENCE BOOKS:

1. Jean J. Labrosse (2000), Embedding System Building Blocks, 2nd edition, CMP publishers, USA.
2. Raj Kamal (2004), *Embedded Systems*, Tata McGraw hill, India.
3. Ajay V. Deshmukh (2005), *Micro Controllers*, Tata McGraw hill, India.
4. Frank Vahid, Tony Givargis (2002), *Embedded System Design*, John Wiley, India.

B. Tech. EEE VII SEMESTER

POWER SYSTEM SWITCHGEAR AND PROTECTION

Course Code: **A1224**

L	T	P	C
4	-	-	4

UNIT - I

CIRCUIT BREAKERS: Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages.- Restriking Phenomenon, Average and Max. RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications: Types and Numerical Problems. – Auto reclosures. Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT - II

ELECTROMAGNETIC AND STATIC RELAYS: Principle of Operation and Construction of Attracted armature, Balanced Beam, Induction Disc and Induction Cup relays.

RELAYS CLASSIFICATION: Instantaneous, DMT and IDMT types. Application of relays: Over current/ Under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays.

UNIVERSAL TORQUE EQUATION, DISTANCE RELAYS: Impedance, Reactance and Mho and Off-Set Mho relays, Comparison. Static Relays: Static Relays verses Electromagnetic Relays.

UNIT - III

GENERATOR, FEEDER AND BUS-BAR PROTECTION: Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected. Protection of Bus bars – Differential protection.

PROTECTION OF TRANSFORMERS AND TRANSMISSION LINES: Percentage Differential Protection, Buchholtz relay Protection. Over Current, Three-zone distance relay protection using Impedance relays. Translay Relay.

UNIT - IV

POWER SYSTEM TRANSIENTS: Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions , Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

UNIT - V

NEUTRAL GROUNDING: Grounded and Ungrounded Neutral Systems.- Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance - Arcing Grounds and Grounding Practices.

PROTECTION AGAINST OVER VOLTAGES : Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lightning Arresters.

TEXT BOOKS:

1. Badari Ram, D. N. Viswakarma (2007), Power System Protection and Switchgear, 1st edition, Tata McGraw Hill Publications, New Delhi.
2. C. L. Wadhwa (2011), Electrical Power Systems, 6th edition, New Age International (P) Limited, New Delhi.

REFERENCE BOOKS:

1. Sunil S. Rao (1999), Switchgear and Protection, 10th edition, Khanna Publishers, New Delhi.
2. M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A. Chakraborti (1999), A Text Book on Electrical Engineering, 1st edition, Dhanpat Rai & Co. Pvt. Ltd, New Delhi.

B. Tech. EEE VII SEMESTER

POWER SYSTEM OPERATION AND CONTROL

Course Code: **A1225**

L	T	P	C
3	1	-	4

UNIT - I

ECONOMIC OPERATION OF POWER SYSTEMS: Optimal operation of Generators in Thermal Power Stations, heat rate Curve, Cost Curve, Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation with line losses neglected. Optimum generation allocation including the effect of transmission line losses, Loss Coefficients, General transmission line loss formula**.**

UNIT - II

HYDROTHERMAL SCHEDULING: Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, Scheduling problems-Short term hydrothermal scheduling problem.

UNIT - III

MODELLING OF TURBINE, GENERATOR AND AUTOMATIC CONTROLLERS: Modeling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models. Modeling of Generator (Steady State and Transient Models): Description of Simplified Network Model of a Synchronous Machine (Classical Model), Description of Swing Equation (No Derivation) and State-Space II-Order Mathematical Model of Synchronous Machine.

MODELLING OF GOVERNOR: Mathematical Modeling of Speed Governing System. Derivation of small signal transfer function.

MODELLING OF EXCITATION SYSTEM: Fundamental Characteristics of an Excitation system, Transfer function, Block Diagram Representation of IEEE Type-1 Model.

UNIT - IV

LOAD FREQUENCY CONTROL: Necessity of keeping frequency constant. Definitions of Control area, Single area control. Block diagram representation of an isolated power system, Steady state analysis, Dynamic response, uncontrolled case. Load frequency control of 2-area system, uncontrolled case and controlled case, tie-line bias control

LOAD FREQUENCY CONTROLLERS: Proportional plus Integral control of single area and its block diagram representation, steady state response, Load Frequency Control and Economic dispatch control.

UNIT - V

REACTIVE POWER CONTROL: Overview of Reactive Power control, Reactive Power compensation in transmission systems, advantages and disadvantages of different types of compensating equipment for transmission systems. Load compensation, Specifications of load compensator. Uncompensated and compensated transmission lines: shunt and Series Compensation, deregulation.

TEXT BOOKS:

1. I. J. Nagrath, D. P .Kothari (2006), Modern Power System Analysis, 3rd edition, McGraw Hill higher Education, New Delhi, India.
2. P. S. R. Murthy (2008), Power System operation and Control, 1st edition, Tata McGraw Hill Publishers, New Delhi.

REFERENCE BOOKS:

1. Hadi Saadat (2010), Power System Analysis, Revised Edition, PSA Publishers, New Delhi.
2. O. I. Elgerd (2007), Electric Energy systems Theory, 2nd edition, Tata McGraw hill Publications, New Delhi.

B. Tech. EEE VII SEMESTER

POWER SEMICONDUCTOR DRIVES

Course Code: **A1226**

L	T	P	C
4	-	-	4

UNIT - I

CONTROL OF DC MOTORS BY PHASE CONTROLLED CONVERTERS: Introduction to Thyristor controlled Drives, Single Phase semi and Fully controlled converters connected to D.C separately excited and D.C series motors, continuous current operation, output voltage and current waveforms. Speed and Torque expressions, Speed - Torque Characteristics. Three phase semi and fully controlled converters connected to D.C separately excited and D.C series motors, output voltage and current waveforms. Speed and Torque expressions, Speed–Torque characteristics and Problems.

UNIT - II

FOUR QUADRANT OPERATION OF DC DRIVES: Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.C motors by dual converters – Closed loop operation of DC motor (Block Diagram Only).

CONTROL OF DC MOTORS BY CHOPPERS: Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors. Continuous current operation, Output voltage and current wave forms, Speed torque expressions, speed torque characteristics. Problems on Chopper fed D.C Motors, Closed Loop operation (Block Diagram Only)

UNIT - III

CONTROL OF INDUCTION MOTOR OF STATOR SIDE: Variable voltage characteristics, Control of Induction Motor by Ac Voltage Controllers, Waveforms, speed torque characteristics.

STATOR FREQUENCY CONTROL: Variable frequency characteristics, Variable frequency control of induction motor by Voltage source and current source inverter and cyclo converters. PWM control, Comparison of VSI and CSI operations, Speed torque characteristics, numerical problems on induction motor drives, Closed loop operation of induction motor drives (Block Diagram Only)

UNIT - IV

CONTROL OF INDUCTION MOTOR OF ROTOR SIDE: Static rotor resistance control, Slip power recovery, Static Scherbius drive, Static Kramer Drive, their performance and speed torque characteristics, advantages applications and problems

UNIT - V

CONTROL OF SYNCHRONOUS MOTORS: Separate control & self control of synchronous motors. Operation of self controlled synchronous motors by VSI and CSI cyclo converters. Load commutated CSI fed Synchronous Motor, Operation, Waveforms, speed torque characteristics, Applications, Advantages and Numerical Problems. Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control, Cyclo converter, PWM, VFI, CSI

TEXT BOOKS:

1. G. K. Dubey (2002), Fundamentals of Electric Drives, 2nd edition, Narosa Publications, New Delhi.
2. M. H. Rashid (2003), Power Electronic Circuits, Devices and applications, 3rd edition, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. M. D. Singh, K. B. Khanchandani (2008), Power Electronics, 2nd Edition, Tata McGraw Hill Publications, New Delhi.
2. Vedam Subramanyam (2008), Thyristor Control of Electric drives, 1st Edition, Tata McGraw Hill Publications, New Delhi, India.
3. S. K. Pillai (2007), A First course on Electrical Drives, 2nd Edition, New Age International (P) Ltd., New Delhi.

B. Tech. EEE VII SEMESTER

HUMAN VALUES AND ETHICS

Interdepartmental Elective - II
(Common to EEE, ME, AE & CE)

Course Code: **A1016**

L	T	P	C
4	-	-	4

UNIT - I

HUMANVALUES: Morals, values and ethics, integrity, work ethic, service learning, civic virtue, respect for others, living peacefully, caring, sharing, honesty, courage, valuing time, co-operation, commitment, empathy, self-confidence, character and spirituality.

UNIT - II

ENGINEERING ETHICS: Senses of 'Engineering Ethics', variety of moral issued, types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, Gilligan's theory, consensus and controversy, models of professional roles, theories about right action, self-interest, customs and religion, uses of ethical theories.

UNIT - III

ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering as experimentation, engineers as responsible experimenters, codes of ethics, a balanced outlook on law, the challenger case study.

UNIT - IV

SAFETY, RESPONSIBILITIES AND RIGHTS: Safety and risk, assessment of safety and risk, risk benefit analysis and reducing risk, the Three Mile Island and Chernobyl case studies. Collegiality and loyalty, respect for authority, collective bargaining, confidentiality, conflicts of interest, occupational crime, professional rights, employee rights, Intellectual Property Rights (IPR), discrimination.

UNIT - V

GLOBAL ISSUES: Multinational corporations, environmental ethics, computer ethics, weapons development, engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of ethics like ASME, ASCE, IEEE, institution of engineers (India), Indian institute of materials management, institution of electronics and telecommunication engineers (IETE),India, etc.

TEXT BOOKS:

1. Mike Martin, Roland Schinzinger(1996), *Ethics in Engineering*, McGraw-Hill, New York.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S (2004), *Engineering Ethics*, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. Charles D. Fleddermann(2004), *Engineering Ethics*, Pearson Education / Prentice Hall, New Jersey.
2. Charles E Harris, Michael S. Protchard, Michael J Rabins(2000), *Engineering Ethics - Concepts and Cases*, Wadsworth Thompson Learning, United States.
3. John R Boatright(2003), *Ethics and the Conduct of Business*, Pearson Education, New Delhi.
4. Edmund G Seebauer and Robert L Barry, (2001), *Fundamentals of Ethics for Scientists and Engineers,* Oxford University Press, New York.

B. Tech. EEE VII SEMESTER

HUMAN RESOURCE MANAGEMENT

Interdepartmental Elective - II

(Common to EEE, ME, AE & CE)

Course Code: **A1017**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION HUMAN RESOURCE MANAGEMENT: Introduction and significance of HRM, Scope, functions of HRM, changing environment of HRM and Challenges. Human Resource Planning, Objectives, Factors influencing Human Resource planning, HR Planning Process.

UNIT - II

JOB ANALYSIS AND RECRUITMENT: Process and Sources of Recruitment; Selection, process of selection and techniques, Retention of Employees.

UNIT - III

HUMAN RESOURCES DEVELOPMENT: Training Vs Development, Need, Process of training, Methods of training, Training Evaluation, Career planning, Performance Management System, Methods of Appraisal, Common Errors.

UNIT - IV

COMPENSATION MANAGEMENT: Concepts and components of wages, Factors influencing wage fixation, Job evaluation, Methods of payment, Incentives and Fringe benefits.

UNIT - V

MANAGING INDUSTRIAL RELATIONS: Components of Industrial Relation, Trade Unions, functions of Trade Union, Employee Participation, Importance and Schemes, Collective Bargaining, Grievance Redressal, Industrial Dispute Settlement machinery.

TEXT BOOKS:

1. Biswajeet Pattnayak (2009), *Human Resource Management*, Prentice hall of India, New Delhi, India.
2. R. Wayne Mondy and Robert M. Noe (2009), *Human Resource Management*, Pearson, India.

REFERENCE BOOKS:

1. Aswathappa. K. (2007), *Human Resources and Personnel Management*, Tata MC Graw Hill, New Delhi, India.
2. Monappa. A, Saiyadain. M. (1979), *Personnel Management*, Tata Mc Graw Hill, New Delhi, India.
3. C. B. Mamoria (2003), *Personnel Management*, Himalaya Publishing House, India.

B. Tech. EEE VII SEMESTER

ENTERPRENEURSHIP

Interdepartmental Elective - II

(Common to EEE, ME, AE & CE)

Course Code: **A1018**

L	T	P	C
4	-	-	4

UNIT - I

ENTREPRENEURSHIP: Importance and role of entrepreneurship, Characteristics of entrepreneurship, Qualities of an entrepreneur, Functions of entrepreneur; Theories of entrepreneurship, Stimulants of entrepreneurship and Barriers to entrepreneurship, Ethics and Social Responsibility, Role of entrepreneur in economic development.

UNIT - II

INSTITUTIONAL SUPPORT: Role of Government; Role of IDBI, SIDBI, SIDO, NIESBUD, SISI, DIC, Entrepreneurship Development Institute, MSMEs.

UNIT - III

WOMEN ENTREPRENEURSHIP: Role & Importance, Functions of women entrepreneur, Profile of Indian Women Entrepreneur, Problems of Women Entrepreneurs, Women Entrepreneurship Development in India and in Foreign Countries.

UNIT - IV

PROJECT MANAGEMENT: Concept of project and classification of project identification, project formulation - project report - project design, Project appraisal - profitability appraisal - project planning - social cost benefit analysis - financial analysis and project financing.

UNIT - V

TRAINING: Designing appropriate training programmes to inculcate Entrepreneurial Spirit, significance of entrepreneurial training, Training for New and Existing Entrepreneurs, Feedback and Performance of Trainees.

TEXT BOOKS:

1. Robert Hisrich, Michael P. Peter, Dean A. Shepherd (2010), E*ntrepreneurship*, Tata Mc Graw Hill, New Delhi.

REFERENCE BOOKS:

1. Bholanath Datta (2009), *Entrepreneurship*, Excel publications, India.
2. David H. Holt (2010), *Entrepreneurship*, Prentice hall of India, New Delhi, India.

B. Tech. EEE VII SEMESTER

BUSINESS COMMUNICATION

Interdepartmental Elective - II

(Common to EEE, ME, AE & CE)

Course Code: **A1019**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION TO MANAGERIAL COMMUNICATION: Meaning, Importance and objectives, Principles of Communication, Forms of communication, Communication Process, Barriers To effective communication, Gateways to effective communication.

UNIT - II

NONVERBAL COMMUNICATION: Body Language, Gestures, Postures, Facial Expressions, Dress Code. Listening and Speaking Skills, Probing questions, Observation, Business and Social etiquette.

UNIT - III

MANAGERIAL SPEECHES: Principles of Effective Speech & Presentations. Technical and Non-technical presentations. Speech of introduction, speech of thanks, occasional speech, theme speech, Use of audio visual aids.

UNIT - IV

INTERVIEW TECHNIQUES: Mastering the art of conducting and giving interviews, Placement interviews, discipline/technical interviews, appraisal interviews, exit Interviews. *Group communication*: Importance, Meetings, group discussions, Video conferencing.

UNIT - V

INTRODUCTION TO BUSINESS CORRESPONDENCE: *Business letters*: Enquiries, Circulars, Quotations, Orders, Acknowledgments, Executions, Complaints, Persuading letters, Sales letters, Job application letters, Bio-data, Covering Letter, Interview Letters, Letter of Reference, Memos, minutes, Circulars and Notices. *Reports:* Types of Business Reports - Format, Choice of vocabulary, Coherence, paragraph writing, organization reports by individual, Report by committee.

TEXT BOOKS:

1. Lesikar R. V, Flatley M. E (2005), *For Empowering the Internet Generation*, Tata McGraw Hill Publishing Company Ltd., New Delhi, India.
2. Ludlow. R, Panton. F (1998), *The Essence of Effective Communications*, Prentice Hall of India Pvt. Ltd., New Delhi, India.

REFERENCE BOOKS:

1. Adair .J (2003), *Effective Communication,* Pan Macmillan, London.
2. Pan Mcmillan Thill J. V, Bovee G. L (1993), *Excellence in Business Communication,* Tata McGraw Hill, New York.
3. Bowman J.P, Branchaw P. P (1987), *Business Communications: From Process to Product*, Dryden Press, Chicago.

B. Tech. EEE VII SEMESTER

INTELLECTUAL PROPERTY AND PATENT RIGHTS

(Interdepartmental Elective - II)

Common to EEE, ME, AE & CE

Course Code: **A1020**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION TO INTELLECTUAL PROPERTY: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II

TRADE MARKS: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark' trade mark registration processes.

UNIT - III

LAW OF COPY RIGHTS : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right regisffation, notice of copy right' international copy right law.

LAW OF PATENTS: Foundation of patent law, patent searching process' ownership rights and transfer.

UNIT - IV

TRADE SECRETS: Trade secrete law, determination of trade secrete status' liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

UNFAIR COMPETITION: Misappropriation right of publicity, false advertising.

UNIT - V

NEW DEVELOPMENT OF INTELLECTUAL PROPERTY: New developments in trade mark law; copy right law patent law, intellectual property audits'. International overview on intellectual property, international - trade mark law, copy right law, international patent law, and international development trade secrets law.

TEXT BOOKS:

1. Deborah. E. Bouchoux (2009*), Intellectual property*, Cengage learning, India.
2. Deborah. E. Bouchoux (2001), *Protecting your companies intellectual property*, AMACOM, USA.

REFERENCE BOOKS:

1. Prabudda ganguli (2003), *Intellectual property right*, Tata McGraw Hill Publishing company ltd., India.
2. Robert Hisrich, Michael P. Peter, Dean A. Shepherd (2010), *Entrepreneurship*, Tata Mc Graw Hill, India.

B. Tech. EEE VII SEMESTER

PROJECT PLANNING AND MANAGEMENT

Interdepartmental Elective - II

(Common to EEE, ME, AE & CE)

Course Code: **A1021**

L	T	P	C
4	-	-	4

UNIT - I

PERT AND CPM : Introduction, origin of PERT and CPM, planning, scheduling and controlling, bar charts, milestone charts, weaknesses in bar charts, PERT and CPM networks comparison, event, activity, rules for drawing networks, numbering the events (Fulkerson's law), dummy activities.

UNIT - II

CPM - PERT NETWORK ANALYSIS : Time estimate, expected time, earliest allowable occurrence time, latest allowable occurrence time, slack, project duration, probability of completion, start and finish time estimates, floats, project scheduling, critical and sub-critical path. Updating - process of updating, when to update.

UNIT - III

CPM COST MODEL & RESOURCES ALLOCATIONS, RESOURCE SCHEDULING : Cost analysis, direct and indirect costs, operation time, normal and crash times and costs, optimizing project cost, crash limit, free float limit, optimization. Resource smoothening, resource leveling.

UNIT - IV

MANAGEMENT: Scope of construction management, significance of construction management, concept of scientific management, psychology in management, a historical account of management philosophy, qualities of manager, the roles/functions performed by effective and competent managers, the manager - as a decision maker, as a motivator, as a communication-link, as a conflict resolver, as a well wisher of co-employees and the employer etc.

UNIT - V

ORGANIZATION: Types of organization, merits and demerits of different types of organization, authority, policy, recruitment process and training; development of personnel department; labor problems; labor legislation in India; 'workmen's compensation act of 1923 and minimum wages act of 1948', and subsequent amendments. Safety in construction.

TEXT BOOKS:

1. Punmia, Khandelwal (2006), *Project planning and control with PERT and CPM*, 3rd edition, Laxmi Publications, New Delhi, India.

REFERENCE BOOKS:

1. L. S. Srinath (1975), *PERT and CPM*, 2nd Edition, Afflicted East West Press Pvt. Ltd, New Delhi, India.
2. U. K. Shrivastava (1999), *Construction Planning and Management*, Galgotia Publications Pvt. Ltd., New Delhi**,** India**.**

B. Tech. EEE VII SEMESTER

HIGH VOLTAGE ENGINEERING

(Professional Elective - I)

Course Code: **A1227**

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION TO HIGH VOLTAGE TECHNOLOGY AND APPLICATIONS: Electric Field Stresses, Gas / Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

UNIT - II

BREAK DOWN IN GASEOUS, LIQUID DIELECTRICS AND SOLID DIELECTRICS: Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT - III

GENERATION OF HIGH VOLTAGES AND CURRENTS: Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

MEASUREMENT OF HIGH VOLTAGES AND CURRENTS: Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

UNIT - IV

OVER VOLTAGE PHENOMENON AND INSULATION CO-ORDINATION: Natural causes for over voltages – Lightning phenomenon, Overvoltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems.

UNIT - V

NON-DISTRUCTIVE TESTING OF MATERIAL AND ELECTRICAL APPARATUS: Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.

HIGH VOLTAGE TESTING OF ELECTRICAL APPARATUS: Testing of Insulators and bushings, Testing of Isolators and circuit breakers, Testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements.

TEXT BOOKS:

1. M. S. Naidu, V. Kamaraju (2009), *High Voltage Engineering*, 4th edition, Tata McGraw Hill Publications, New Delhi.
2. E. Kuffel, W. S. Zaengl, J. Kuffel (2000), *High Voltage Engineering: Fundamentals*, 2nd edition, Elsevier Publishers, New York, USA.

REFERENCE BOOKS:

1. C. L. Wadhwa (2007), *High Voltage Engineering*, New Age Internationals (P) Limited, New Delhi.
2. Ravindra Arora Wolfgang Mosch (2011), *High Voltage Insulation Engineering,* 1st edition*,* New Age International (P) Ltd., New Delhi.

B. Tech. EEE VII SEMESTER

ENERGY MANAGEMENT

Professional Elective - I

(Common to EEE & ECE)

Course Code: **A1228**

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION: Principles of Energy Management, Managerial Organization. Functional Areas for Manufacturing Industry, Process Industry, Commerce, Government. Role of Energy Manager in each of the organization. Initiating, Organizing and Managing Energy Management Programs.

UNIT - II

ENERGY AUDIT: Definition and Concepts, Types of Energy Audits, Basic Energy Concepts. Resources for Plant Energy Studies, Data Gathering, Analytical Techniques. Energy Conservation: Technologies for Energy Conservation , Design for Conservation of Energy materials, energy flow networks, critical assessment of energy usage, formulation of objectives and constraints, synthesis of alternative options and technical analysis of options, process integration.

UNIT - III

ECONOMIC ANALYSIS: Scope, Characterization of an Investment Project, Types of Depreciation, Time Value of money, budget considerations, Risk Analysis.

UNIT - IV

METHODS OF EVALUATION OF PROJECTS: Payback, Annualized Costs, Investor's Rate of return, Present worth, Internal Rate of Return. Pros and Cons of the common methods of analysis, replacement analysis. Energy Consultant: Need of Energy Consultant, Consultant Selection Criteria.

UNIT - V

ALTERNATIVE ENERGY SOURCES: Solar Energy: Types of devices for Solar Energy Collection, Thermal Storage System. Control Systems, Wind Energy, Availability, Wind Devices, Wind Characteristics, Performance of Turbines and systems.

TEXT BOOKS:

1. W. R. Murphy, G. McKay (2008), *Energy Management,* 1st edition*,* B.S. Publications, New Delhi.

REFERENCE BOOKS:

1. B. Smith (2007), *Energy Management Principles*, 1st edition, Pergamon Press, Inc., England.

B. Tech. EEE VII SEMESTER

LINEAR SYSTEMS ANALYSIS
(Professional Elective - I)

Course Code: **A1229**

L	T	P	C
3	1	-	4

UNIT - I

STATE VARIABLE ANALYSIS: Choice of state variables in Electrical networks, Formulation of state equations for Electrical networks, Equivalent source method. Network topological method, Solution of state equations, Analysis of simple networks with state variable approach.

UNIT - II

FOURIER SERIES AND FOURIER TRANSFORM REPRESENTSATION: Introduction, Trigonometric form of Fourier series, Exponential form of Fourier series, Wave symmetry, Fourier integrals and transforms, Fourier transform of a periodic function , Properties of Fourier Transform , Parseval's theorem , Fourier transform of some common signals, Fourier transform relationship with Laplace Transform.

APPLICATIONS OF FOURIER SERIES AND FOURIER TRANSFORM REPRESENTATION: Introduction, Effective value and average values of non sinusoidal periodic waves, currents, Power Factor, Effects of harmonics, Application in Circuit Analysis, Circuit Analysis using Fourier series.

UNIT - III

LAPLACE TRANSFORM APPLICATIONS: Application of Laplace transform Methods of Analysis. Response of RL, RC, RLC Networks to Step, Ramp, and impulse functions, Shifting Theorem. Convolution Integral and Applications.

TESTING OF POLYNOMIALS: Elements of realisability, Hurwitz polynomials, positive real functions, Properties, Testing, Sturm's Test, examples.

UNIT - IV

NETWORK SYSNTHESIS: Synthesis of one port LC networks-Foster and Cauer methods-Synthesis of RL and RC one port networks-Foster and Cauer methods.

SAMPLING: Sampling theorem – Graphical and Analytical proof for Band Limited Signal impulse sampling, natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, introduction to Band Pass sampling, Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Power density spectrum, Relation between auto correlation function and Energy / Power spectral density function.

UNIT - V

Z-TRANSFORMS: Fundamental difference between continuous and discrete time signals, discrete time complex, exponential and sinusoidal signals, periodicity of discrete time complex exponential, concept of Z-Transform of a discrete sequence. Distinction between Laplace, Fourier and Z-Transforms. Region of convergence in Z-Transforms, constraints on ROC for various classes of signals, Inverse Z-Transform properties of Z-Transforms.

TEXT BOOKS:

1. A. N. Tripathi (1998), *Linear System Analysis*, 1st edition, New Age International (P) Limited, New Delhi.
2. D. Roy Chowdhary (2005), *Network and Systems,* 1st edition, New Age International (P) Limited, New Delhi.

REFERENCE BOOKS:

1. Prof. Satyanarayana, A. Rama Devi (2005), *Analysis of Linear System*, 1st edition, Right Publications, New Delhi.

B. Tech. EEE VII SEMESTER

INSTRUMENTATION

(Professional Elective - I)

Course Code: **A1230**

L	T	P	C
3	1	-	4

UNIT - I

CHARACTERISTICS OF SIGNALS: Measuring Systems, Performance Characteristics, - Static characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Statistical Analysis of Random Errors.

SIGNALS AND THEIR REPRESENTATION: Signal and their representation: Standard Test, periodic, aperiodic, modulated signal, sampled data, pulse modulation and pulse code modulation

UNIT - II

OSCILLOSCOPE: Cathode ray oscilloscope-Cathode ray tube-time base generator-horizontal and vertical amplifiers-CRO probes-applications of CRO-Measurement of phase and frequency-lissajous patterns-Sampling oscilloscope-analog and digital type.

UNIT - III

SIGNAL ANALYZERS: Wave Analyzers- Frequency selective analyzers, Heterodyne, Application of Wave analyzers-Harmonic Analyzers, Total Harmonic distortion, spectrum analyzers, Basic spectrum analyzers, spectral displays, vector impedance meter, Q meter. Peak reading and RMS voltmeters

UNIT - IV

TRANSDUCERS: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of resistor, inductor, LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Synchros, Piezo electric transducers, photovoltaic, photo conductive cells, photo diodes.

UNIT - V

MEASUREMENT OF NON-ELECTRICAL QUANTITIES-I: Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque.

MEASUREMENT OF NON-ELECTRICAL QUANTITIES-II: Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

TEXT BOOKS:

1. D. V. S. Murthy (2010), *Transducers and Instrumentation,* 2nd Edition, Prentice Hall of India, New Delhi.
2. A. K. Sawhney (2011), *A course in Electrical and Electronic Measurements and Instrumentation*, 19th edition, Dhanpatrai & Co., New Delhi.

REFERENCE BOOKS:

1. A. S. Morris (2001), *Principles of Measurement and Instrumentation*, 3rd Edition, Prentice Hall of India, New Delhi, India.
2. H. S. Kalsi (2010), *Electronic Instrumentation*, 3rd Edition, Tata McGraw Hill Publications, New Delhi.

B. Tech. EEE VII SEMESTER

SPECIAL ELECTRICAL MACHINES
(Professional Elective - I)

Course Code: **A1231**

L	T	P	C
3	1	-	4

UNIT - I

SYNCHRONOUS RELUCTANCE MOTORS: Constructional features, Types, Axial and radial air gap motors, Operating principle, Reluctance, Phasor diagram, Characteristics, Vernier motor.

UNIT - II

STEPPING MOTORS: Constructional features, Principle of operation, Variable reluctance motor, Hybrid motor, Single and multi stack configurations. Theory of torque predictions, Linear and non-linear analysis, Characteristics, Drive circuits.

UNIT - III

SWITCHED RELUCTANCE MOTORS: Constructional features, Principle of operation, Torque prediction. Power controllers, Non-linear analysis, Microprocessor based control, Characteristics, Computer control.

UNIT - IV

PERMANENT MAGNET BRUSHLESS D.C. MOTORS: Principle of operation, Types, Magnetic circuit analysis. EMF and torque equations, Power controllers , Motor characteristics and control.

UNIT - V

PERMANENT MAGNET SYNCHRONOUS MOTORS: Principle of operation, EMF and torque equations. Reactance, Phasor diagram, Power controllers, Converter, Volt-ampere requirements. Torque speed characteristics, Microprocessor based control.

TEXT BOOKS:

1. T. J. E. Miller (1989), *Brushless Permanent Magnet and Reluctance Motor Drives*, 1st edition, Clarendon Press, London.
2. P. P. Aearnley (1982), *Stepping Motors – A Guide to Motor Theory and Practice*, 1st Edition, Peter Perengrinus, London.

REFERENCE BOOKS:

1. T. Kenjo (1984), *Stepping Motors and Their Microprocessor Controls*, 1st Edition, Clarendon Press London.
2. T. Kenjo, S. Nagamori (1988), *Permanent Magnet and Brushless DC Motors*, 1st edition, Clarendon Press, London.

B. Tech. EEE VII SEMESTER

POWER SYSTEM TRANSIENTS
(Professional Elective - I)

Course Code: **A1232**

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION AND SURVEY: Source of transients, various types of power systems transients, effect of transients on power systems, importance of study of transients in planning.

UNIT - II

SWITCHING TRANSIENTS: Introduction, circuit closing transients: RL circuit with sine wave drive, double frequency transients, observations in RLC circuit and basic transforms of the RLC circuit. Resistance switching: Equivalent circuit for the resistance switching problems, equivalent circuit for interrupting the resistor current. Load switching: Equivalent circuit, waveforms for transient voltage across the load, switch; normal and abnormal switching transients. Current suppression, current chopping, effective equivalent circuit. Capacitance switching, effect of source regulation, capacitance switching with a restrike, with multiple restrikes, illustration for multiple restriking transients, ferro resonance.

UNIT - III

LIGHTNING TRANSIENTS: Causes of over voltage, lightning phenomenon, charge formation in the clouds, rate of charging of thunder clouds, mechanisms of lighting strokes, characteristics of lightning strokes, factors contributing to good line design, protection afforded by ground wires, tower footing resistance.

INTERACTION BETWEEN LIGHTNING AND POWER SYSTEM: Mathematical model for lightning.

UNIT - IV

TRAVELLING WAVES ON TRANSMISSION LINE COMPUTATION OF TRANSIENTS: Transient response of systems with series and shunt lumped parameters and distributed lines. Travelling wave concept: step response, Bewely's lattice diagram, standing waves and natural frequencies, reflection and refraction of travelling waves.

UNIT - V

TRANSIENTS IN INTEGRATED POWER SYSTEM: The short line and kilometric fault, distribution of voltage in a power system: Line dropping and load rejection; voltage transients on closing and reclosing lines; over voltage induced by faults; switching surges on integrated system; EMTP for transient computation.

TEXT BOOKS:

1. Allan Greenwood (1991), *Electrical Transients in Power Systems*, 2nd edition, Wiley Interscience, New York.
2. C. L. Wadhwa (2011), *Electrical Power Systems*, 2nd edition, New Age International (P) Limited, New Delhi.

REFERENCE BOOKS:

1. R. D. Begamudre (2011), *Extra High Voltage AC Transmission Engineering*, 4th edition, Wiley Eastern Ltd., New Delhi, India.

B. Tech. EEE VII SEMESTER

ELECTRICAL MEASUREMENTS LAB

Course Code: **A1233**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. Calibration and Testing of Single Phase Energy Meter.
2. Calibration of Dynamometer Power Factor Meter.
3. Measurement of 3 Phase Reactive Power with Single-Phase Wattmeter.
4. Measurement of Parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
5. Calibration of PMMC ammeter and PMMC voltmeter using Crompton D.C. Potentiometer.
6. Measurement of Resistance using Kelvin's double bridge.
7. Schering Bridge & Anderson Bridge.
8. Calibration of LPF wattmeter by Phantom testing.
9. Dielectric Oil Testing using H.T testing Kit.
10. Measurement of 3 phase power with single watt meter and two current transformers.
11. Microprocessor based ramp type DVM Digital Frequency meter.
12. Measurement of Iron loss in a bar specimen using a wattmeter.

B. Tech. EEE VII SEMESTER

POWER SYSTEMS AND SIMULATION LAB - I

Course Code: **A1234**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. Analysis of Single Line To Ground Fault
2. Analysis of Line To Line Fault
3. Determination of A, B, C, D parameters, hybrid parameters and image parameters of a given transmission model.
4. Performance of a Long Transmission Line Under No Load And Under Light Load Condition
5. Performance of a Long Transmission Line Under Load At Different Power Factors
6. Performance Characteristics of a Typical Dc Distribution System (Radial Configuration)
7. Conduct a power flow study on a given power system network using Gauss- Seidel iterative method
8. Conduct a power flow study on a given power system network using Newton -Raphson method
9. Develop a program to solve Swing Equation.
10. Simulation of a single- area load frequency problem.
11. Simulation of a two- area load frequency problem.
12. Design a PID controller for two- area power system and simulate the same.

SYLLABI FOR VIII SEMESTER

B. Tech. EEE VIII SEMESTER

UTILIZATION OF ELECTRICAL ENERGY

Course Code: **A1236**

L	T	P	C
3	1	-	4

UNIT - I

ELECTRIC DRIVES: Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT - II

ELECTRIC HEATING and WELDING: Advantages and methods of electric heating, resistance heating induction heating and dielectric heating. Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

UNIT - III

ILLUMINATION: Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light.

TYPES OF LAMPS: Discharge lamps, MV and SV lamps – comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of lighting and flood lighting.

UNIT - IV

ELECTRIC TRACTION - I: System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, methods of electric braking-plugging rheostatic braking and regenerative braking.

UNIT - V

ELECTRIC TRACTION - II: Mechanics of train movement. Speed-time curves for different services – trapezoidal and quadrilateral speed time curves. Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion**.**

TEXT BOOKS:

1. G. C. Garg (2005), *Utilization of Electrical Power & Electric traction*, 8th edition, Khanna publishers, New Delhi.
2. N. V. Suryanarayana (2005), *Utilization of Electrical Power including Electric drives and Electric traction*, 1st edition New Age International (P) Ltd., New Delhi.

REFERENCE BOOKS:

1. Partab (2007), *Art & Science of Utilization of electrical Energy*, 2nd edition, Dhanpat Rai & Sons, New Delhi.
2. C. L. Wadhwa (2005), *Generation, Distribution and Utilization of Electrical Energy*, 2nd edition, New Age International (P) Ltd., New Delhi.

B. Tech. EEE VIII SEMESTER

ELECTRICAL DISTRIBUTION SYSTEMS

(Professional Elective - II)

Course Code: **A1237**

L	T	P	C
3	1	-	4

UNIT - I

GENERAL CONCEPTS: Introduction to distribution systems, Load modelling and characteristics. Coincidence factor, contribution factor loss factor - Relationship between the load factor and loss factor. Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

UNIT - II

DISTRIBUTION FEEDERS & SUBSTATIONS: Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system. Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

UNIT - III

SYSTEM ANALYSIS: Voltage drop and power-loss calculations - Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT - IV

PROTECTION AND COORDINATION: Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, line sectionalizes, and circuit breakers Coordination of Protective Devices: General coordination procedure.

UNIT - V

COMPENSATION FOR POWER FACTOR IMPROVEMENT AND VOLTAGE CONTROL: Capacitive compensation for power-factor control. Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched), Power factor correction, capacitor allocation - Economic justification - Procedure to determine the best capacitor location.

VOLTAGE CONTROL: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

TEXT BOOKS:

1. Turan Gonen (2007), *Electric Power Distribution system Engineering*, 5th edition, Tata McGraw Hill Book Company, New Delhi.
2. A.S. Pabla (2004), *Electric Power Distribution*, 5th edition, Tata McGraw Hill Education, New Delhi.

REFERENCE BOOKS:

1. S. Sivanagaraju, V. Sankar (2006), *Electrical Power Distribution and Automation*, 1st edition, Dhanpat Rai & Co, New Delhi, India.
2. S. Sivanagaraju, S. Satyanarayana (2008), *Electric Power Transmission and Distribution,* 1st edition, Pearson Education India, New Delhi.

B. Tech. EEE VIII SEMESTER

HIGH VOLTAGE DC TRANSMISSION AND FACTS

(Professional Elective - II)

Course Code: **A1238**

L	T	P	C
3	1	-	4

UNIT - I

HVDC CONCEPTS: Economics and Terminal equipment of HVDC transmission systems: Types of HVDC Links, Apparatus required for HVDC Systems. Comparison of AC &DC Transmission, Application of DC Transmission System, Planning & Modern trends in D.C. Transmission.

HVDC CONVERTERS & SYSTEM CONTROL: Choice of Converter configuration, analysis of Graetz, characteristics of 6 Pulse converters , Cases of two 3 phase converters in star –star mode and their performance. Principal of DC Link Control, Converters Control Characteristics, Firing angle control. Current and extinction angle control, Effect of source inductance on the system, Power Control.

UNIT - II

POWER FLOW ANALYSIS & REACTIVE POWER CONTROL IN HVDC: Modeling of DC Links-DC Network-DC Converter, Controller Equations-Solution of DC load flow. P.U. System for DC quantities-solution of AC-DC Power flow-Simultaneous method, Sequential method. Reactive Power Requirements in steady state, Conventional control strategies. Alternate control strategies, sources of reactive power, shunt capacitors Synchronous Condenser

CONVERTER FAULT & PROTECTION: Converter faults, protection against over current and over voltage in converter station. Surge arresters, smoothing reactors, DC breakers, Audible noise, space charge field, corona effects on DC lines-Radio interference.

UNIT - III

HARMONICS: Generation of Harmonics, Characteristics harmonics, calculation of AC Harmonics, Non- Characteristics harmonics, adverse effects of harmonics. Calculation of voltage & Current harmonics, Effect of Pulse number on harmonics.

FILTERS: Types of AC filters, Design of Single tuned filters. Design of High pass filters.

UNIT - IV

FACTS CONCEPTS: Transmission interconnections, power flow in an AC System, loading capability limits, Power flow and Dynamic stability considerations, importance of controllable parameters Opportunities for FACTS, basic types of FACTS controllers, benefits from FACTS controllers.

UNIT - V

STATIC SHUNT COMPENSATORS: Objectives of shunt compensation, mid point voltage regulation for line segmentation, End of line voltage support to prevent voltage instability, improvement of transient stability, Power oscillation damping. Methods of controllable var generation: variable impedance type static var generators TCR and TSR, TSC, FC-TCR, TSC-TCR

STATIC SERIES COMPENSATORS: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements, GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC).

TEXT BOOKS:

1. K. R. Padiyar (2005), *HVDC Power Transmission Systems: Technology and system Interactions*, 1st edition, New Age International (P) Ltd, New Delhi.
2. N. G. Hingorani, L. Guygi (2001), *Understanding FACTS*, 1st edition, IEEE Press, USA.

REFERENCE BOOKS:

1. E. W. Kimbark (2006), *Direct Current Transmission*, 2nd edition, John Wiley & Sons, New Delhi.
2. K. R. Padiyar (2009), *FACTS Controllers in power Transmission and Distribution,* 1st edition, New Age International (P), Ltd, New Delhi.

B. Tech. EEE VIII SEMESTER

POWER QUALITY

(Professional Elective - II)

Course Code: **A1239**

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION: Importance of power quality, terms and definitions of power quality as per IEEE std. 1159 such as transients, short and long duration voltage variations, interruptions, short and long voltage fluctuations, imbalance, flickers and transients. Symptoms of poor power quality: Definitions and terminology of grounding, Purpose of groundings, Good grounding practices and problems due to poor grounding.

UNIT - II

FLICKERS AND TRANSIENT VOLTAGES: RMS voltage variations in power system and voltage regulation per unit system, complex power. Principles of voltage regulation, Basic power flow and voltage drop, Various devices used for voltage regulation and impact of reactive power management. Various causes of voltage flicker and their effects, Short term and long term flickers. Various means to reduce flickers. Transient over voltages, sources, impulsive transients, switching transients, Effect of surge impedance and line termination, control of transient voltages.

UNIT - III

VOLTAGE SAG, SWELLS AND INTERRUPTIONS: Definitions of voltage sag and interruptions, Voltage sags versus interruptions. Economic impact of voltage sag, Major causes and consequences of voltage sags, Voltage sag characteristics, Voltage sag assessment. Influence of fault location and fault level on voltage sag, Areas of vulnerability.

LIMITS AND MEASURES FOR VOLTAGE SAG: Assessment of equipment sensitivity to voltage sags, Voltage sag limits for computer equipment, CBEMA, ITIC, SEMI F 42 curves. Representation of the results of voltage sags analysis, Voltage sag indices, Mitigation measures for voltage sags, such as UPS, DVR, SMEs, CVT etc., utility solutions and end user solutions.

UNIT - IV

WAVEFORM DISTORTION: Definition of harmonics, inter-harmonics, sub-harmonics. Causes and effect of harmonics, Voltage versus current distortion. Overview of Fourier analysis, Harmonic indices, A.C. quantities under non-sinusoidal conditions. Triplen harmonics, characteristics and non characteristics harmonics, harmonics series and parallel resonances, Consequences of harmonic resonance. Principles for controlling harmonics, Reducing harmonic currents in loads. K-rated transformer. Harmonic study procedure. Computer tools for harmonic analysis, Locating sources of harmonics, Harmonic filtering, passive and active filters. Modifying the system frequency response.

UNIT - V

POWER QUALITY MONITORING: Need of power quality monitoring and approaches followed in power quality monitoring. Power quality monitoring objectives and requirements. Initial site survey. Power quality Instrumentation. Selection of power quality monitors, selection of monitoring location and period. System wide and discrete power quality monitoring. Setting thresholds on monitors, data collection and analysis. Selection of transducers. Harmonic monitoring , Transient monitoring, event recording and flicker monitoring.

TEXT BOOKS:

1. M. H. J. Bollen (2000), *Understanding Power Quality Problems, voltage sag and interruptions,* 1st edition, IEEE Press, New Delhi.
2. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso, H. Wayne Beaty (2008), *Electrical Power Systems Quality,* 2nd edition, Tata McGraw Hill Publications, New Delhi.

REFERENCE BOOKS:

1. J. Arrillaga, M. R. Watson, S. Chan (2007), *Power system quality assessment,* 1st edition, John Wiley and sons, New Delhi.

B. Tech. EEE VIII SEMESTER

ADVANCED CONTROL SYSTEMS

(Professional Elective - II)

Course Code: **A1240**

L	T	P	C
3	1	-	4

UNIT - I

STATE SPACE ANALYSIS: State Space Representation, Solution of State Equation, State Transition Matrix, Canonical Forms: Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form.

UNIT - II

CONTROLLABILITY AND OBSERVABILITY: Tests for controllability and observability for continuous time systems, Time varying case, minimum energy control, time invariant case. Principle of Duality, Controllability and observability form Jordan canonical form and other canonical forms.

DESCRIBING FUNCTION ANALYSIS: Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

UNIT - III

PHASE-PLANE ANALYSIS: Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

STABILITY ANALYSIS: Stability in the sense of Lyapunov. Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.

UNIT - IV

MODEL CONTROL: Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement. Full order observer and reduced order observer.

CALCULUS OF VARIATIONS: Minimization of functionals of single function, constrained minimization. Minimum principle, Control variable inequality constraints. Control and state variable inequality constraints. Euler Lagrangine Equation.

UNIT - V

OPTIMAL CONTROL: Formulation of optimal control problem. Minimum time, Minimum energy, minimum fuel problems. State regulator problem. Output regulator problem. Tracking problem, Continuous-Time Linear Regulators.

TEXT BOOKS:

1. K. Ogata (2008), *Modern Control Engineering*, 4th edition, Prentice Hall of India Pvt. Ltd, New Delhi.
2. M. Gopal (2005), *Modern Control System Theory*, 2nd edition, New Age International Publishers, New Delhi.

REFERENCE BOOKS:

1. J. Nagrath, M. Gopal (2011), *Control Systems Engineering*, 5th edition, New Age International (P) Ltd, New Delhi.
2. M. Gopal (2009), *Digital Control and State Variable Method*, 3rd edition, Tata McGraw-Hill Companies, New Delhi.

B. Tech. EEE VIII SEMESTER

DYNAMICS OF ELECTRICAL MACHINES

(Professional Elective - II)

Course Code: **A1241**

L	T	P	C
3	1	-	4

UNIT - I

BASIC MACHINE THEORY: Electromechanical Analogy, Magnetic saturation, rotating field theory, operation of induction motor, equivalent circuit, steady state equations of DC machines. Operation of synchronous motor, power angle characteristics

UNIT - II

ELECTRO DYNAMICAL EQUATIONS AND THEIR SOLUTIONS: Spring and Plunger system, Rotation motion, mutually coupled coils. Lagrange's equations: Applications of Lagrange's equations, solution of electro dynamical equations.

UNIT - III

DYNAMICS OF DC GENERATORS: Separately excited DC generators, steady state analysis, and transient analysis.

DYNAMICS OF DC MOTORS: Separately excited DC motors, steady state analysis, transient analysis, Interconnection of machines, Ward Leonard system of speed control.

UNIT - IV

INDUCTION MACHINE DYNAMICS: Induction machine dynamics during starting and braking, accelerating time. Induction machine dynamics during normal operations, equation for dynamical response of the induction motor.

UNIT - V

SYNCHRONOUS MACHINE DYNAMICS: Electromechanical equation, motor operation, Generator operation, small oscillations, general equations for small oscillations. Representation of oscillation equations in a state variable form.

TEXT BOOKS:

1. D. P. Sen Gupta, J. W. Lynn (2008), *Electrical Machine Dynamics*, 1st edition, Macmillan Press Ltd, USA.
2. P. S. Bimbhra (2002), *Generalized theory of Electrical Machines*, 5th edition, Khanna Publishers, New Delhi.

REFERENCE BOOKS:

1. Vedam Subramanyam (2008), *Thyristor Control of Electric Drives*, 1st edition, Tata McGraw Hill Education, New Delhi.

B. Tech. EEE VIII SEMESTER

ADVANCED POWER SYSTEM PROTECTION

(Professional Elective - II)

Course Code: **A1242**

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION TO PROTECTIVE RELAYS: Primary and back up protection, current transformers for protection, potential transformer, review of electromagnetic relays static relays. Over current relays time current characteristic, current setting time setting, directional relay, static over current relays.

UNIT - II

DISTANCE PROTECTION - I: Impedance, reactance, mho, angle impedance relays. Input quantities for various types of distance relays, effect of arc resistance on the performance of distance relays, selection of distance relays. MHO relay with blinders, quadrilateral relay, elliptical relay. Restricted mho, impedance directional, reactance relays. Swiveling characteristics.

UNIT - III

DISTANCE PROTECTION - II: Compensation for correct distance measurement, reduction of measuring units switched schemes. Pilot relaying schemes.

DISTANCE PROTECTION - III: Wire pilot protection, circulating current scheme, balanced voltage scheme, transley scheme, carrier current protection, phase comparison carrier current protection, carrier aided distance protection.

UNIT - IV

DIGITAL RELAYING TECHNIQUES: Digital relaying algorithms, differential equation technique, discrete Fourier transform technique, Walsh-Hadamard transform technique, rationalized Harr transform technique, removal of dc offset.

UNIT - V

MICROPROCESSOR BASED PROTECTIVE RELAYS: Over current, directional, impedance, reactance relays. Generalized mathematical expressions for distance relays, mho and offset mho relays, quadrilateral relay. Microprocessor implementation of digital distance relaying algorithms.

TEXT BOOKS:

1. Badri Ram, D. N. Vishwakarma (2007), *Power System Protection & Switchgear*, 1st edition, Tata McGraw Hill Publications, New Delhi.
2. T. S. Madhava Rao (2008), *Power System Protection Static Relays*, 2nd edition, Tata McGraw Hill Publications, New Delhi.

REFERENCE BOOKS:

1. B. Ravindra Nath, M. Chandra (2005), *Power System Protection & Switchgear*, 1st edition, New age International (P) Ltd, New Delhi.

B. Tech. EEE VIII SEMESTER

RELIABILITY ENGINEERING

(Professional Elective - III)

Course Code: **A1243**

L	T	P	C
3	1	-	4

UNIT - I

BASIC PROBABILITY THEORY: Rules for combining probability, Probability Distributions, Random variables, density and distribution functions. Mathematical expectation. Binominal distribution, Poisson distribution, normal distribution, exponential distribution, Weibull distribution.

UNIT - II

RELIABILITY: Definition of Reliability. Significance of the terms appearing in the definition. Component reliability, Hazard rate, derivation of the reliability function in terms of the Hazarad rate, Hazard models.

FAILURES: Causes of failures, types of failures, Modes of failure, Bath tub curve, Effect of preventive maintenance. Measures of reliability: mean time to failure and mean time between failures.

UNIT - III

CLASSIFICATION OF ENGINEERING SYSTEMS: Series, parallel, series-parallel, parallel-series and non-series-parallel configurations. Expressions for the reliability of the basic configurations.

RELIABILITY LOGIC DIAGRAMS: Reliability evaluation of Non-series-parallel configurations: minimal tie-set, minimal cut-set and decomposition methods. Deduction of the minimal cut sets from the minimal path sets.

UNIT - IV

DISCRETE MARKOV CHAINS: General modeling concepts, stochastic transitional probability matrix, time dependent probability evaluation and limiting state probability evaluation. Absorbing states.

CONTINUOUS MARKOV PROCESSES: Modeling concepts, State space diagrams, Stochastic Transitional Probability Matrix, Evaluating limiting state Probabilities. Reliability evaluation of repairable systems.

UNIT - V

SERIES SYSTEMS AND PARALLEL SYSTEM: Series systems, parallel systems with two and more than two components, Network reduction techniques. Minimal cut set/failure mode approach.

TEXT BOOKS:

1. Roy Billinton, Ronald. N. Allan (2009), *Reliability Evaluation of Engineering Systems*, 4th edition, Plenum Press, New York, USA.
2. Hoang Pham (2003), *Handbook of Reliability Engineering,* 1st edition, Springer Verlag, New York.

REFERENCE BOOKS:

1. Charles E. Ebeling (2010), *An Introduction to Reliability and Maintainability Engineering*, 3rd edition, Tata McGraw Hill Edition, New Delhi.

B. Tech. EEE VIII SEMESTER

DIGITAL CONTROL SYSTEMS

(Professional Elective - III)

Course Code: **A1244**

L	T	P	C
3	1	-	4

UNIT - I

SAMPLING AND RECONSTRUCTION: Introduction, Examples of Data control systems, Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

UNIT - II

THE Z - TRANSFORMS: Introduction, Linear difference equations, pulse response, Z - transforms, Theorems of Z - Transforms, the inverse Z - transforms, Modified Z – Transforms.

Z - PLANE ANALYSIS OF DISCRETE - TIME CONTROL SYSTEM: Z - Transform method for solving difference equations, Pulse transforms function, block diagram analysis of sampled data systems, mapping between S - plane and Z - plane.

UNIT - III

STATE SPACE ANALYSIS: State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations.

CONTROLLABILITY AND OBSERVABILITY: Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

UNIT - IV

STABILITY ANALYSIS: Mapping between the S - Plane and Z – Plane, Primary strips and Complementary Strips, Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z - Plane. Jury stability test, Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT - V

DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS: Transient and steady state response Analysis, Design based on the frequency response method, Bilinear Transformation and Design procedure in the W - plane, Lead, Lag and Lead - Lag compensators and digital PID controllers.

STATE FEEDBACK CONTROLLERS AND OBSERVERS: Design of state feedback controller through pole placement, Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order and Reduced order observers.

TEXT BOOKS:

1. K. Ogata (2011), *Discrete-Time Control systems*, 2nd edition, Pearson Education / Prentice Hall of India, New Delhi.
2. Kuo (2003), *Digital Control Systems*, 2nd edition, Oxford University Press, New Delhi.

REFERENCE BOOKS:

1. M. Gopal (2009), *Digital Control and State Variable Methods*, 3rd edition, Tata McGraw Hill Publications, New Delhi.

B. Tech. EEE VIII SEMESTER

EXTRA HIGH VOLTAGE AC TRANSMISSION

(Professional Elective - III)

Course Code: **A1245**

L	T	P	C
3	1	-	4

UNIT - I

PRELIMINARIES: Necessity of EHV AC transmission, advantages and problems. Power handling capacity and line losses- mechanical considerations, resistance of conductors, properties of bundled conductors, bundle spacing and bundle radius with examples.

LINE AND GROUND REACTIVE PARAMETERS: Line inductance and capacitances, sequence inductances and capacitances, modes of propagation, ground return with examples.

UNIT - II

VOLTAGE GRADIENTS OF CONDUCTORS: Electrostatics: field of sphere gap, field of line changes and properties. Charge , potential relations for multi-conductors, surface voltage gradient on conductors. Distribution of voltage gradient on sub-conductors of bundle with examples.

UNIT - III

CORONA EFFECTS - I: Power loss and audible noise (AN): corona loss formulae, charge voltage diagram, generation, characteristics and limits. Measurements of AN, relation between 1-phase and 3-phase AN levels with examples.

CORONA EFFECTS - II: Radio interference (RI) : corona pulses generation, properties, limits. Frequency spectrum, modes of propagation, excitation function, measurement of RI, RIV and excitation functions with examples.

UNIT - IV

ELECTRO STATIC FIELD: Electrostatic field: calculation of electrostatic field of EHV/AC lines, effect on humans, animals and plants , electrostatic induction in un energized circuit of double-circuit line, electromagnetic interference with examples.

TRAVELING WAVE THEORY: Traveling wave expression and solution, source of excitation, terminal conditions. Open circuited and short-circuited end, reflection and refraction coefficients. Lumped parameters of distributed lines-generalized constants, No load voltage conditions and charging current.

UNIT - V

VOLTAGE CONTROL: Power circle diagram and its use, voltage control using synchronous condensers. Cascade connection of shunt and series compensation. Sub synchronous resonance in series capacitor, compensated lines, static VAR compensating system.

TEXT BOOKS:

1. Rakosh Das Begamudre (2011), *Extra High Voltage AC Transmission Engineering*, 4th edition, New Age International (P) Ltd, New Delhi.

REFERENCE BOOKS:

1. S. Rao (2009), *EHVAC - HVDC transmission and Distribution Engineering*, 3rd edition, Khanna Publishers, New Delhi, India.

B. Tech. EEE VIII SEMESTER

MACHINE MODELLING AND ANALYSIS

(Professional Elective - III)

Course Code: **A1246**

L	T	P	C
3	1	-	4

UNIT - I

BASIC TWO POLE MACHINE: Basic Two-pole DC machine - primitive 2-axis machine - Voltage and Current relationship - Torque equation.

UNIT - II

MODELLING AND ANALYSIS OF DC MACHINES: Mathematical model of separately excited DC motor and DC Series motor in state variable form - Transfer function of the motor - Numerical problems. Mathematical model of D.C. shunt motor and D.C. Compound motor in state variable form - Transfer function of the motor - Numerical Problems.

UNIT - III

TRANSFORMATIONS: Linear transformation - Phase transformation (a, b, c to a, p, o) - Active transformation (a, p, o to d, q).

MODELLING OF THREE PHASE INDUCTION MACHINES: Circuit model of a 3 - pahse Induction motor, linear transformation, Phase Transformation, Transformation to a Reference frame, two axis models for Induction motor.

UNIT - IV

REFERENCE FRAME THEORY: Voltage and current Equations in stator reference frame - Equation in Rotor reference frame - Equations in a synchronously rotating frame - Torque equation-Equations in state-space form.

UNIT - V

MODELLING OF SYNCHRONOUS MACHINE: Circuit model of a 3ph Synchronous motor - Two axis representation of Syn. Motor. Voltage and current Equations in state - space variable form - Torque equation.

TEXT BOOKS:

1. P. S. Bimbhra (2002), *Generalized Theory of Electrical Machines,* 5th edition, Khanna Publishers, New Delhi.
2. Vedam Subramanyam (2008), *Thyristor control of Electric Drives*, 1st Edition, Tata McGraw Hill Education, New Delhi.

REFERENCE BOOKS:

1. Paul C. Krause, Oleg wasynezuk, Scott D. Sudhoff (2002), *Analysis of Electric Machinery and Drive Systems*, 2nd Edition, Wiley Publishers, New Delhi.

B. Tech. EEE VIII SEMESTER

SOLAR ENERGY AND ITS APPLICATIONS

(Professional Elective - III)

Course Code: **A1247**

L	T	P	C
3	1	-	4

UNIT - I

PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and Sun shine, solar radiation data.

UNIT - II

SOLAR ENERGY COLLECTION, STORAGE AND APPLICATIONS: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. Different methods of solar energy storage, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating /cooling technique, solar distillation and drying.

UNIT - III

PHOTO VOLTAICS (PV): Fundamentals of solar cells, types of solar cells, semiconducting materials, band gap theory, absorption of photons, excitations and photo emission of electrons, band engineering.

PV CELL PROPERTIES: Solar cell properties and design, p-n junction photodiodes, depletion region, electrostatic field across the depletion layer, electron and holes transports, device physics, charge carrier generation, recombination and other losses, I-V characteristics, output power.

UNIT - IV

SOLAR CELL APPLICATIONS: PV cell interconnection, module structure and module fabrication, Equivalent circuits, load matching, efficiency, fill factor and optimization for maximum power, Design of stand-alone PV systems, system sizing, device structures, device construction, DC to AC conversion, inverters, on-site storage and grid connections.

UNIT - V

COST ANALYSIS AND ENVIRONMENTAL ISSUES: Cost analysis and pay back calculations for different types of solar panels and collectors, installation and operating costs, Environmental and safety issues, protection systems, performance monitoring.

TEXT BOOKS:

1. G. D. Rai (2009), *Non-Conventional Energy Sources*, 4th edition, Khanna Publishers, New Delhi.
2. Martin A. Green (2008), *Solar Cells: Operating Principles, Technology and system Applications*, 1st edition, Prentice Hall, New Delhi.

REFERENCES BOOKS:

1. Sukatme (2008), *Solar Energy*, 3rd Edition, McGraw Hill Companies, New Delhi.
2. D. Yogi gosuami, Frank Kreith, Jan F. Kreider (2000), *Principles of Solar Engineering*, 2nd edition, Taylor & Francis, USA.

B. Tech. EEE VIII SEMESTER

PROGRAMMABLE LOGIC CONTROLLERS

(Professional Elective - III)

Course Code: **A1248**

L	T	P	C
3	1	-	4

UNIT - I

PLC BASICS: PLC system, I/O modules and interfacing, CPU processor, programming Equipment, programming formats, construction of PLC ladder diagrams, Devices connected to I/O modules.

UNIT - II

PLC PROGRAMMING: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation.

LADDER DIAGRAMS: Digital logic gates, programming in the Boolean algebra system, conversion examples
Ladder Diagrams for process control: Ladder diagrams & sequence listings, ladder diagram construction and flowchart for spray process system.

UNIT - III

PLC RESISTERS: Characteristics of Registers, module addressing, holding registers, Input Registers, Output Registers.

PLC FUNCTIONS: Timer functions and Industrial applications, counters, counter function industrial applications, Arithmetic functions, Number comparison functions, number conversion functions.

UNIT - IV

DATA HANDLING FUNCTIONS: SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR & Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two-axis and three axis Robots with PLC, Matrix functions.

UNIT - V

ANALOG PLC OPERATION: Analog modules& systems, Analog signal processing, Multi bit Data Processing, Analog output Application Examples, PID principles, positions indicator with PID control, PID Modules, PID tuning, PID functions.

TEXT BOOKS:

1. John W. Webb, Ronald A. Reiss (2008), *Programmable Logic Controllers - Principles and Applications*, 5th edition, Prentice Hall of India, New Delhi.

REFERENCES BOOKS:

1. J. R. Hackworth, F. D. Hackworth (2004), *Programmable Logic Controllers - Programming Method and Applications*, 1st edition, Pearson Education, New Delhi.

B. Tech. EEE VIII SEMESTER

POWER SYSTEMS AND SIMULATION LAB - II

Course Code: **A1249**

L	T	P	C
-	-	6	2

LIST OF EXPERIMENTS:

1. Determination of breakdown strength of oil by variable distance electrodes.
2. Determination of earth resistance under various conditions.
3. Mille Volt Drop Test.
4. Breakdown characteristic of Sphere air gap (100mm Sphere gap).
5. Breakdown characteristic of Plane Rod gap.
6. Breakdown Voltage of PIN Insulator & Measurement of Leakage Current.
7. MATLAB Program for optimum loading of Generation.
8. MATLAB Program for building of Z_{bus} algorithm by addition of branch or link.
9. PSCAD Simulation of transient stability of multimachine system.
10. PSCAD Simulation of Lightning strikes, faults or breaker operations.
11. PSCAD Simulation of Insulation coordination of transformers, breakers and arrestors.
12. PSCAD Simulation of Impulse testing of transformers.

B. Tech. EEE VIII SEMESTER

TECHNICAL SEMINAR

Course Code: **A1250**

L	T	P	C
-	-	6	2

1. OBJECTIVE:

Seminar is an important component of learning in an Engineering College, where the student gets acquainted with preparing a report & presentation on a topic.

2. **PERIODICITY / FREQUENCY OF EVALUATION: Twice**

3. PARAMETERS OF EVALUATION:

1. The seminar shall have two components, one chosen by the student from the course-work without repetition and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work.
2. The two components of the seminar are distributed between two halves of the semester and are evaluated for 50 marks each. The average of the two components shall be taken as the final score.
3. The students shall be required to submit the rough drafts of the seminar outputs within one week of the commencement of the class work.
4. Supervisor shall make suggestions for modification in the rough draft. The final draft shall be presented by the student within a week thereafter.
5. Presentation schedules will be prepared by different Departments in line with the academic calendar.

The Seminars shall be evaluated in two stages as follows:

A. Rough draft

In this stage, the student should collect information from various sources on the topic and collate them in a systematic manner. He/ She may take the help of the concerned supervisor.

The report should be typed in “MS-Word” file with “calibri” font, with font size of 16 for main heading, 14 for sub-headings and 11 for the body text. The contents should also be arranged in Power Point Presentation with relevant diagrams, pictures and illustrations. It should normally contain 18 to 25 slides, consisting of the followings:

1.	Topic, name of the student & guide	1 Slide
2.	List of contents	1 Slide
3.	Introduction	1 - 2 Slides
4.	Descriptions of the topic (point-wise)	7 - 10 Slides
5.	Images, circuits etc.	6 - 8 Slides
6.	Conclusion	1 - 2 Slides
7.	References/Bibliography	1 Slide

The soft copy of the rough draft of the seminar presentation in MS Power Point format along with the draft Report should be submitted to the concerned supervisor, with a copy to the concerned HOD within 30 days of the commencement of class work.

The evaluation of the Rough draft shall generally be based upon the following.

1.	Punctuality in submission of rough draft and discussion	2 Marks
2.	Resources from which the seminar have been based	2 Marks
3.	Report	3 Marks
4.	Lay out, and content of Presentation	3 Marks
5.	Depth of the students knowledge in the subject	5 Marks
Total		15 Marks

After evaluation of the first draft the supervisor shall suggest further reading, additional work and fine tuning, to improve the quality of the seminar work.

Within 7 days of the submission of the rough draft, the students are to submit the final draft incorporating the suggestions made by the supervisor.

B. Presentation:

After finalization of the final draft, the students shall be allotted dates for presentation (in the designated seminar classes) and they shall then present it in presence students, supervisor, faculties of the department and at least one faculty from some department / other department.

The student shall submit 3 copies of the Report neatly bound along with 2 soft copies of the PPT in DVD medium. The students shall also distribute the title and abstract of the seminar in hard copy to the audience. The final presentation has to be delivered with 18-25 slides.

The evaluation of the Presentation shall generally be based upon the following.

1.	Contents	10 Marks
2.	Delivery	10 Marks
3.	Relevance and interest the topic creates	5 Marks
4.	Ability to involve the spectators	5 Marks
5.	Question answer session	5 Marks
Total		35 Marks

4. WHO WILL EVALUATE?

The presentation of the seminar topics shall be made before an internal evaluation committee comprising the Head of the Department or his/her nominee, seminar supervisor and a senior faculty of the department / other department.

B. Tech. EEE VIII SEMESTER

COMPREHENSIVE VIVA

Course Code: **A1251**

L	T	P	C
-	-	-	2

1. OBJECTIVE:

- To enable the examiners to assess the candidate's knowledge in his or her particular field of learning.
- To test the student's awareness of the latest developments and relate them to the knowledge acquired during the classroom teaching.

2. PARAMETERS OF EVALUATION:

Subject Knowledge	Current Awareness	Career Orientation	Communication Skills	Total
20	10	10	10	50

3. WHO WILL EVALUATE?

The comprehensive Viva will be conducted by a committee comprising Head of the Department or his/her nominee, two senior faculty of the respective department and an external examiner from outside the college. The comprehensive viva shall be evaluated for 50 marks at the end of VIII semester. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

4. **PERIODICITY / FREQUENCY OF EVALUATION: Once**

5. PEDAGOGY:

- The viva will be held on a face to face basis.
- The students will be expected to answer the questions related to latest developments and all courses taken till date.
- Viva voce will be conducted within week before the beginning of midterm examinations. However, in exceptional circumstances it can be scheduled immediately after the end of midterm examinations.
- Students will have to make themselves available on the date of the viva voce.

B. Tech. EEE VIII SEMESTER

MINI PROJECT / PROJECT WORK

Course Code: **A1252/ A1235**

L	T	P	C
-	-	12	8

1. OBJECTIVE:

The main objective of the Project Work is for the students to learn and experience all the major phases and processes involved in solving "real life engineering problems".

2. EXPECTED OUTCOME:

The major outcome of the B. Tech project must be well-trained students. More specifically students must have acquired:

- System integration skills
- Documentation skills
- Project management skills
- Problem solving skills

3. PROJECT SELECTION:

Projects are suggested by the faculty, with or without collaboration with an industry. All faculty are to suggest projects. Students are also encouraged to give project proposals after identifying a faculty who would be willing to supervisor the work. A Project brief is to be given by the faculty to the group defining the project comprehensively.

All B. Tech major projects are to be done in the Institute. For industry specified projects, students will be permitted to spend 1-2 weeks in the industry on recommendation by the supervisor. The number of students per batch should be between 2 and 4. If more number of students is really needed, the project may be split into functional modules and given to subgroups.

4. WHO WILL EVALUATE?

The end semester examination shall be based on the report submitted and a viva-voce exam for 150 marks by committee comprising of the Head of the Department, project supervisor and an external examiner.

5. EVALUATION:

The basic purpose is to assess the student competencies with regard to his project work. More specifically to assess the student's individual contribution to the project, to establish the level of understanding of basic theoretical knowledge relevant to the project and to ensure that the student has good understanding and appreciation of design and development decisions taken in the course of the project. It is desirable that all faculty members are present for the evaluations as this is a platform to get to know the student projects and to motivate the students to do good projects. The faculty should adopt a clear and consistent pattern of asking questions from general to specific aspects of the project. The presentation and evaluation is open to other students of the department.

The project work shall be evaluated for 200 marks out of which 50 marks for internal evaluation and 150 marks for end-semester evaluation. The evaluation shall be done on the following basis

Semester VII	**Semester VIII**
Preliminary Evaluation - 10 marks	Design Evaluation II - 25 marks
Design Evaluation I - 15 marks	Final Evaluation – 150 marks

6. GUIDELINES FOR THE PREPARATION OF B. TECH PROJECT REPORTS

1.1. Project reports should be typed neatly only on one side of the paper with 1.5 or double line spacing on a A4 size bond paper (210 x 297 mm). The margins should be: Left - 1.25", Right - 1", Top and Bottom - 0.75".

1.2. The total number of reports to be prepared are:

- One copy to the department
- One copy to the concerned guide(s)
- One copy to the candidate.

1.3. Before taking the final printout, the approval of the concerned guide(s) is mandatory and suggested corrections, if any, must be incorporated.

1.4. For making copies dry tone Xerox is suggested.

1.5. Every copy of the report must contain

- Inner title page (White)
- Outer title page with a plastic cover
- Certificate in the format enclosed both from the college and the organization where the project is carried out.
- An abstract (synopsis) not exceeding 100 words, indicating salient features of the work.

6.6. The organization of the report should be as follows:

1. 2. 3. 4. 5.	Inner title page Abstract or Synopsis Acknowledgments Table of Contents List of table & figures (optional)	Usually numbered in roman

6.7 Chapters (to be numbered) containing Introduction, which usually specifies the scope of work and its importance and relation to previous work and the present developments, Main body of the report divided appropriately into chapters, sections and subsections.

- The chapters, sections and subsections may be numbered in the decimal form for e.g. Chapter 2, sections as 2.1, 2.2 etc., and subsections as 2.2.3, 2.5.1 etc.
- The report should be typed in "MS-Word" file with "calibri" font. The chapter must be left or right justified (font size 16). Followed by the title of chapter centered (font size 18), section/subsection numbers along with their headings must be left justified with section number and its heading in font size 16 and subsection and its heading in font size 14. The body or the text of the report should have font size 11.
- The figures and tables must be numbered chapter wise for e.g.: Fig. 2.1 Block diagram of a serial binary adder, Table 3.1 Primitive flow table, etc.
- The last chapter should contain the summary of the work carried, contributions if any, their utility along with the scope for further work.

6.8. Reference OR Bibliography: The references should be **numbered serially** in the order of their occurrence in the text and their numbers should be indicated within square brackets for e.g. [3]. The section on references should list them in serial order in the following format.

1. For textbooks - A.V. Oppenheim and R.W. Schafer, Digital Signal Processing, Englewood, N.J., Prentice Hall, 3 Edition, 1975.
2. For papers - Devid, Insulation design to combat pollution problem, Proc of IEEE, PAS, Vol 71, Aug 1981, pp 1901-1907.

6.9. Only SI units are to be used in the report. Important equations must be numbered in decimal form for e.g. **V = IZ** ..... **(3.2)**

6.10. All equation numbers should be right justified.

6.11. The project report should be brief and include descriptions of work carried out by others only to the minimum extent necessary. Verbatim reproduction of material available elsewhere should be strictly avoided. Where short excerpts from published work are desired to be included, they should be within quotation marks appropriately referenced.

6.12. Proper attention is to be paid not only to the technical contents but also to the organization of the report and clarity of the expression. Due care should be taken to avoid spelling and typing errors. The student should note that report-write-up forms the important component in the overall evaluation of the project

6.13. Hardware projects must include: the component layout, complete circuit with the component list containing the name of the component, numbers used, etc. and the main component data sheets as Appendix. At the time of report submissions, the students must hand over a copy of these details to the project coordinator and see that they are entered in proper registers maintained in the department.

6.14. Software projects must include a virus free disc, containing the software developed by them along with the read me file. Read me file should contain the details of the variables used, salient features of the software and procedure of using them: compiling procedure, details of the computer hardware/software requirements to run the same, etc. If the developed software uses any public domain software downloaded from some site, then the address of the site along with the module name etc. must be included on a separate sheet. It must be properly acknowledged in the acknowledgments.

6.15. Sponsored Projects must also satisfy the above requirements along with statement of accounts, bills for the same dully attested by the concerned guides to process further, They must also produce NOC from the concerned guide before taking the internal viva examination.

6.16. The reports submitted to the department/guide(s) must be hard bounded, with a plastic covering.

6.17. Separator sheets, used if any, between chapters, should be of thin paper

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

Shamshabad – 501 218, Hyderabad

Department of ……..

CERTIFICATE

Certified that the project work entitled …….. carried out by Mr./Ms. ……., Roll Number ……, a bonafide student of ……in partial fulfillment for the award of **Bachelor of Technology** in …… of the Jawaharlal Nehru Technological University, Hyderabad during the year …….. It is certified that all corrections / suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the said Degree.

Name & Signature of the Guide **Name Signature of the HOD** **Signature of the Principal**

External Viva

Name of the examiners Signature with date

1.

2.

Certificate issued at the Organization where the project was carried out

(On a separate sheet, If applicable)

NAME OF THE INDUSTRY / ORGANIZATION, Address with pin code

CERTIFICATE

Certified that the project work entitled …….. carried out by Mr./Ms . ……., Roll Number……, a bonafide student of ……in partial fulfillment for the award of **Bachelor of Technology** in …… of the Jawaharlal Nehru Technological University, Hyderabad during the year …….. It is certified that, he/she has completed the project satisfactorily

Name & Signature of the Guide **Name & Signature of the Head of Organization**

7. **DISTRIBUTION OF MARKS FOR B.TECH DISSERTATION EVALUATION**

S No.	Particulars	Max. Marks
1	Relevance of the subject in the present context	**10**
2	Literature Survey	**10**
3	Problem formulation	**20**
4	Experimental observation / theoretical modeling	**10**
5	Results – Presentation & Discussion	**20**
6	Conclusions and scope for future work	**10**
7	Overall presentation of the Thesis / Oral presentation	**40**
8	Project Report Writing	**30**
Total Marks		**150**