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SRI VENKATESWARA UNIVERSITY: TIRUPATI
SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course

B.Tech ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

Academic Year 2017-2018

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Vision

- The department aims at catering to the needs and aspirations of the people and their development, reach to the world through state of art technologies of Electrical and Electronics Engineering and to serve the society at large

Mission

- To provide the necessary domain expertise and infrastructure to the students.
- To make available the advanced laboratories, application oriented engineering principles for students and research scholars.
- To offer research and industry orientation to become successful service oriented technocrat.

Programme Outcomes

1. Graduates will have the ability to solve the problems related to their work by applying the knowledge of basic sciences, engineering mathematics, soft computing techniques, electrical and electronics engineering.
2. Graduated students will be in a position to demonstrate his ability to identify and formulate problems.
3. Graduates will be able to design electrical circuits, conduct experiments, analyze and interpret results.
4. Graduates will have a talent to design and develop digital systems.
5. Graduates can visualize and work in laboratories on multidisciplinary tasks.
6. Graduates will be ready to use modern engineering tools and software to analyze problems.
7. Graduates will have the knowledge of professional and ethical responsibilities.
8. Graduates will be able to communicate effectively in both verbal and written form.
9. Graduates will understand the impact of engineering solutions on the society being aware of contemporary issues as a member of a team.
10. Graduates will develop confidence for continued self-learning.
11. Graduates can participate and succeed in competitive examinations.
12. Graduates can do project management with economic viability

PSOs

- Graduates will, demonstrate professional behaviour to cater the global needs of the industry and society**.**
- Graduates will pursue higher education to upgrade their professional and research skills and inculcate the attitude of lifelong learning**.**

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Graduates will develop the qualities like creativity, leadership, team work and professional ethics contributing to the societal growth

EEE 2ND SEMESTER
EET 02:CIRCUIT THEORY

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Basic Circuit Concepts: Active and passive elements – Ideal and practical sources – Source transformation – v-i characteristics of R, L, and C elements – Kirchhoff's laws – Star-delta transformation – Network reduction techniques - Mesh and Nodal Analysis –Concept of mutual inductance – Concept of coupling and dot convention.

UNIT-II

A.C. Fundamentals: Periodic waveforms – Average and effective values of different waveforms – Form factor and crest factor.

A.C. Circuits: Phase and phase difference – Phasor notation – Concept of reactance, impedance, susceptance, and admittance – Active and reactive power – Power factor – Power triangle -Response of R, L, and C elements for sinusoidal excitation – Steady state analysis of RL, RC, and RLC circuits for sinusoidal excitation – Phasor diagrams. Steady state analysis of ac circuits using mesh and nodal analysis.

UNIT-III

Resonance: Series and parallel resonance – Half power frequencies, MA, Q factor and relations between them.

Locus diagrams: Current and Impedance locus diagrams of RL and RC series circuits and two branch parallel circuits.

UNIT IV

Network theorems: Superposition – Thevenin's and Norton's theorems – Millman's theorem – Reciprocity theorem – Tellegen's theorem – Compensation theorem and application of the theorems for dc circuits and sinusoidal steady state circuits – Maximum power transfer theorems for dc and ac circuits

UNIT-V

Three Phase Circuits: Advantages of three phase systems – Phase sequence – Balanced and Unbalanced systems – Magnitude and phasor relationships between line and phase voltages and currents in balanced star and delta circuits – Analysis of balanced and unbalanced three phase circuits with star and delta connected loads, Measurement of three phase power.

Text Books:

1. Hayt, Kemmerly and Durbin, Engineering Circuit Analysis, 6th edition, Tata McGraw-Hill
2. Sudhakar and Shyammohan, Network analysis and synthesis, Tata McGraw-Hill
3. Ravish R. Singh, Electrical Networks, Tata Mc. Graw Hill.
4. Edminster, Electric Circuits – (McGraw Hill Schuam series 1st edition)

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EEE 3RD SEMESTER
MAT 03: ENGINEERING MATHEMATICS - III

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT–I

Special functions: Betaand Gamma functions – Series solution of differential equations – Bessel function – Recurrence formulae – Generation function on $J_n(x)$ – Legender function – Legender Polynomials – Recurrence relation for $P_n(x)$ – Generation function for $P_n(x)$ – Orthogonality – Rodrigues formula.

UNIT–II

Complex analysis – I: Analytical functions – Cauchy-Reimann equations – Complex integration – Cauchy's theorem – Integral formula – Evaluation of integrals.

UNIT–III

Complex analysis – II: Singularities – Poles – Residues – Residue theorem – Evaluation of real integrals – Conformal mapping – Bilinear transformations – Transformation of e^z, z^2, sin z and cos z.

UNIT–IV

Partial differential equations – I : Formation of differential equations – Classification – First order linear partial differential equations – Lagrange linear equation – Method of multipliers – first order non-linear partial differential equations – Charpits method.

UNIT–V

Partial differential equations – II: Method of separation of variables – One dimensional wave equation – Heat equation – Laplace equation.

Text Books:

1. Higher Engineering Mathematics – B.S.Grewal.
2. Engineering Mathematics Vol I & II – M.K.Venkataraman.
3. Engineering Mathematics – M.K.Venkataraman.
4. Elementary Engineering Mathematics – B.S.Grewal.
5. Advanced Engineering Mathematics – Erwin Kreyszig.

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EET: 03 NETWORK ANALYSIS

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Network Topology: Graph, tree, incidence matrix, tie-set and cut -set matrices, Formulation of equilibrium equations based on graph theory, Duality and dual Circuits

UNIT-II

Transient Analysis: DC Transients ,Transient response of RL, RC, and RLC circuits for dc and sinusoidal excitations – Determination of initial conditions – Concept of time constant – Transform circuit analysis – Laplace transforms of signals and periodic functions and initial and final value theorems – Applications for transient response of RL, RC, and RLC circuits.

UNIT-III

Network Functions: One-port and Two-port networks – Driving point and transfer functions of networks – Properties of driving point and transfer functions – Concept of complex frequency, poles and zeros – Time domain response from pole-zero diagram – Restrictions on pole-zero locations.

UNIT-IV

Two-port Network Parameters : Open circuit impedance and short circuit admittance parameters – Hybrid and inverse-hybrid parameters – Transmission and inverse transmission parameters – Inter relationships between parameter sets – Series, Parallel, and Cascade connection of two-ports – Conditions for reciprocity and symmetry of two-port networks. Terminated two-port networks – Image parameters.

UNIT-V

Elementary Ideas of Network Synthesis: Conditions forrealizability– Hurwitz polynomials – Positive real functions – Properties and realization of RL, RC, and LC immitance functions by Foster and Cauer methods.

Text Books:

1. Van Valkenburg, Network Analysis, Pearson Education
2. Sudhakar and Shyammohan, Network analysis and synthesis, Tata McGraw-Hill
3. Ravish R. Singh, Electrical Networks, Tata Mc. Graw Hill, 2009.
4. Roy Choudary, Network Analysis, New Age International
5. Electrical circuits by A.Chakrabarty, Dhanpath Rai & Co.

ECT02 ELECTRONIC DEVICES

Instruction : 4 hrs / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Junction Diodes: Band structure of PN junction. Current components. Volt ampere characteristics and its temperature dependence. Diode resistance and capacitance.Zenerdiode,Tunnel diode, UJT.

UNIT-II

Rectifiers: Diode equivalent circuits, Analysis of diode circuits, Characteristics and comparison of Half-wave, Full-wave and Bridge rectifiers, Analysis of filters (C, L, LC, and CLC) used with Full-wave rectifier.

UNIT-III

Bipolar Junction Transistors: Transistor action. PNP and NPN transistors.CB, CE, and CC configurations and their characteristics.Analytical expressions for transistor characteristics.Typical junction voltages and maximum ratings.Determination of h-parameters from BJT characteristics.

UNIT-IV

Bipolar Junction Transistor Biasing : Operatingpoint, stabilization, thermal runaway.
Field Effect Transistors: Characteristics and parameters of JFET. Depletion and Enhancement type of MOSFETs. Pinch off and saturation. Metal Semiconductor FET,FET biasing schemes.

UNIT-V

Optoelectronic Devices: LED. LCD. Principle of operation and characteristics of Photoconductor, Photodiode, Phototransistor, and Photovoltaic cell.

Text Books :

1. Jacob Millman and Christos C.Halkias, "Integrated Electronics", Tata McGraw-Hill Pub. Co. Ltd.
2. Allen Mottershed, "Electronic Devices and Circuits", Prentice-Hall of India Pvt. Ltd.
1. Ben G.Steetman and Sanjay Banerjee, "Solid State Electronic Devices", Pearson Education (Singapore) Pvt. Ltd.

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EET 04: ELECTROMAGNETIC FIELDS

Instruction : 4hrs / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Electrostatic Fields: Review of Vector Algebra & Vector Calculus,Coulomb's law. Electric field intensity. Electric flux density and Gauss's law. Gauss's law in point form. Electrostatic potential. Potential gradient. Energy stored in electric field.

UNIT-II

Conductors and Dielectrics: Current and current density. Continuity equation. Conductors – Ohm's law, Resistance, Power dissipation, and Joule's law. Dielectrics – Dipole moment, Polarization, and bound charge densities. Boundary conditions. Capacitance.

UNIT-III

Magnetostatic fields: Force of a magnet on a current carrying wire**,** Biot-Savart law. Lorentz force law. Ampere's circuital law. Ampere's circuital law in point form. Scalar and vector Magnetic potential, Magnetic flux density.

UNIT-IV

Magnetic field in materials: Magnetic moment, Magnetization, and Bound current densities. Boundary conditions. Inductance. Energy stored in magnetic field.

UNIT-V

Maxwell's equations: Faraday's law – Motional and Transformer induced emfs, Faraday's law in point form. Displacement current. Maxwell's equations in differential and integral forms. Wave equation and its general solution for free space conditions.

Text Books:

1. Mathew N.O.Sadiku, "Elements of Electromagnetics", Oxford University Press.
2. Edward C.Jordan and Keith G.Balmain, "Electromagnetic Waves and Radiating Systems", Prentice-Hall of India Pvt.Ltd.

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EET 05 :GENERATION OF ELECTRIC POWER

Instruction : 3hrs / week *Credits : 3* *Assessment : 40+ 60*

UNIT-I

Fundamentals of Power Plants: Introduction-concept of power plants, classification of power plants, types of energy, power, power development in India, resources of power generation, present power position in India, future planning for power generation, power corporations in India.

UNIT-II

Thermal Power Stations: Selection of site, Main parts and working of a thermal station, fuel handling, ash handling, steam turbines, water treatment, cooling water system for condensers. Types of boilers, turbo alternators, thermal station lay out, cost of steam stations, super thermal power station.

UNIT–III

Hydro-electric Power Stations: Selection of site, arrangement and location of hydroelectric station, principles of working of a hydro-electro electric plants, power to be developed, size of plant and choice of units, type of turbines and their characteristics, draft tubes, penstock, power station structure and lay out, cost of hydro electric station.

UNIT-IV

Gas Turbine Stations: Selection of site, Main parts of gas turbine plant and principles of operation, characteristics of gas turbine plants, plant lay out.
Nuclear power Stations: Selection of site, Main Parts, types of reactors, location and layout of nuclear power plant, reactor control and nuclear waste disposal.

UNIT-V

Non Conventional Energy sources: Need for Non conventional energy sources-Solar electric system principle and applications, wind electric system principle and applications, bio-mass and bio-gas plants and applications, Fuel cells, Tidal and Geothermal power.

Text Books:

1. Power plant Engineering by A.K.Rajaetc,New age International Publishers.
2 Elements of Power Station Design by M.V.Deshpande, 3rd edition, Wheeler's Publication.
3. Electric Power Generation, Transmission and Distribution by S.N.Singh, Prentice-Hall of India.
4 A Course in Electrical Power by J.B.Gupta,S.K, Kataria& Sons.
5Generation, Distribution and Utilization if Electrical Power by CL Wadhwa, Wiley Eastern, Ltd., New Delhi

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EET 06 :ELECTROMECHANICAL ENERGY CONVERSION-I

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

DC Generators: Constructional details of dc machine, armature windings and its types, Emf equation, wave shape of induced emf, armature reaction, effect of brush lead, demagnetizing and cross magnetizing ampere turns, compensating windings, commutation, emf induced in a coil undergoing commutation, time of commutation, methods of improving commutation, OCC and load characteristics of different types of generators.

UNIT-II

DC Motors: Force on conductor carrying current, Torque and power developed by armature, speed control of dc motors, starting of dc motors: constructional details of 3-point and 4-point starters, load characteristics of dc motors Losses in dc machine, condition for maximum efficiency

UNIT-III

Parallel operation of DC Generators: dc shunt and series generators in parallel, equalizing connections
Testing of dc machines: Brake test, Swinburne's test, Hopkinson's test, Fields test, Retardation test, Separation of iron and frictional losses

UNIT-IV

Single Phase Transformers: Constructional details, Principle of transformer, emf equation, ideal transformer, leakage flux, and phasor diagram of transformer, equivalent circuit, determination of parameters of equivalent circuit, losses and efficiency

UNIT-V

Testing of transformers: Predetermination of performance from OC and SC tests, Sumpner's test, separation of hysterisis and eddy current losses. Parallel operation of transformer, load sharing. Auto transformer, principle, saving of copper as compared to two winding transformer. Switching in phenomenon

Text Books:

1. I.J.Nagrath ,D.P.Kothari, "Electric Machines", New Age International Ltd.
2. B.R.Gupta, Vandana Singhal, " Fundamentals of Electrical Machines", New Age International Ltd.
3. A.E.Clayton, N.N.Hancock, " The Performance and design of Direct Current Machines", CBS Publishers and distributors.

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EEE 4th SEM

EET07:SIGNALS AND SYSTEMS

Instruction : 4hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT-I

Signal Analysis : Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Exponential and sinusoidal signals, continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components Periodicity of discrete time using complex exponential signal, Concepts of Impulse function, Unit step function, Signum function. properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

UNIT-II

Signal Transmission Through Linear Systems : Discrete time signals and sequences, linear shift invariant systems,(LTI) stability and causality, linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems Linear system, impulse response, Response of a linear system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT-III

Convolution and Correlation of Signals : Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT-IV

Laplace Transforms : Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT-V

Z–Transforms : Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.-Transfer function-BIBO stability –System response to standard signals-solution of difference equations with initial conditions.

Text Books :

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

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ECT55:ANALOG CIRCUITS

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Rectifiers: Diode equivalent circuits, Analysis of diode circuits, Characteristics and comparison of Half-wave, Full-wave and Bridge rectifiers, Analysis of filters (C, L, LC, and CLC) used with Full-wave rectifier.
General Amplifiers: Concept of Amplifier, Voltage gain, Current gain, Power gain, Input and Output resistances, Conversion efficiency, Frequency response, Bandwidth, Distortion, Classification of amplifiers.

UNIT-II

BJT Amplifiers: BJT biasing schemes, Hybrid model, Small signal analysis of single stage BJT amplifiers, Comparison of CE, CB and CC amplifiers, Approximate model analysis, Effects of coupling and bypass capacitors on low frequency response, Hybrid-Π model at high frequencies, Parameters $f_{ß}$ and f_T

UNIT-III

FET Amplifiers: FET biasing schemes, Small signal model, Analysis of CS, CD and CG amplifiers, High frequency response.

UNIT-IV

Multistage Amplifiers: Types of coupling, Choice of amplifier configuration, overall voltage gain and Bandwidth of n-stage amplifier, Darlington and Bootstrap circuits.
Power Amplifiers: Class-A large signal amplifiers, Transformer coupled audio power amplifiers, Push-pull amplifiers, Class-B amplifiers, Class-AB operation, and Complementary symmetry power amplifier.

UNIT-V

Feedback amplifiers: Feedback concept, Classification, Effects of negative feedback on gain, Stability, Noise, Distortion, Bandwidth, Input and Output resistances, Different types of feedback circuits without analysis.
Sinusoidal oscillators: Barkhausen criterion, RC phase shift, Wien bridge, Hartley and Colpitts oscillators, Crystal oscillator.

Text Books:

1. Millman and Halkias, “Integrated Electronics”, Mc Graw-Hill Co.
2. Mottershed, “Electronic devices and circuits”, PHI

References:

1. S.Salivahanan, “Electronic Devices and circuits”, TMH.
2. David A.Bell, “Electronic Devices and circuits”, PHI

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ECT56:DIGITAL LOGIC DESIGN

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Number Systems and Codes: Review of binary, octal, decimal and hexadecimal number systems and their interconversion. BCD, Grey, ASCII, Parity bit.
Boolean Algebra and Logic Gates: NOT, OR, AND operations. Boolean theorems, De morgan's theorem, Symbols and truth tables of logic gates (NOT, OR, AND, NAND, NOR, XOR, XNOR), Universal gates, IEEE standard logic symbols.

UNIT-II

Combinational logic circuits: Standard forms of logical functions, Minterm and maxterm specifications, Simplification by K-maps, Incompletely specified functions, Realization of logical functions using gates, Decoders and encoders, Multiplexers and demultiplexers, Digital magnitude comparator.

UNIT-III

Sequential circuits: Latches, Clocked flip-flops, SR, JK, D and T flip flops, Timing problems and master-slave flip-flops, Shift registers, Asynchronous and synchronous counters, Ring and Johnson counters, Application of counters.

UNIT-IV

Arithmetic circuits: Signed binary numbers, Binary arithmetic, Binary adders and subtractors, Serial and parallel adders, Integrated-circuit parallel adder and its applications, Binary multipliers, ALU.

UNIT-V

Memory Devices: Terminology, ROM, PROM, EPROM, EEPROM, CDROM. Semiconductor RAM and its architecture, SRAM, DRAM, Memory expansion.

Text Books:

1. Ronald J.Tocci, Neal S.Widmer, "Digital systems – Principles and applications". 8th edition, Pearson Education Asia, 2001.
2. Virendra kumar, "Digital technology – Principles and applications", New age International publishers, 1998.

References:

1. Taub and schilling, "Digital integrated Electronics", Mc Graw-Hill Co.
2. John M, Yarbrough, "Digital logic – applications and design", Thomson-Brooks India edition.
3. S.Salivahanan and S.Arivazhagan", Digital circuits and design", Vikas Publishing house.

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EET10:ELECTRICAL& ELECTRONIC MEASUREMENTS

Instruction : 3hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT–I

General Theory of instruments – Introduction - Accuracy – Precision – Types of errors –Deflecting, control, and damping torques in instruments – PMMC type of instrument –Moving iron and dynamometer type instruments.

UNIT–II

Circuits for D.C. measurements – Measurement of potential difference, current, and resistance – Carey-Foster bridge – Kelvin double bridge - A.C & DC potentiometers.

UNIT–III

Principle of bridge measurements – Measurement of inductance, capacitance, and resistance using different AC bridges. Instrument transformers – Ratio and phase angle errors.

UNIT–IV

Measurement of power – Electrodynamic instruments, Induction instruments.
Measurement of energy – Single phase and three phase energy meters.
Power factor meters,Synchroscopes, Ratiometers.

UNIT – V

Frequency meters, Q-meters, Oscilloscopes, digital voltmeters potentiometric rec orders multimeter error analysis.

Text Books:

1. C.T.Baldwin, "Fundamentals of Electrical Measurements".
2. Helfric and Cooper, "Modern Electronic Instrumentation and Measurement Techniques".
3. John P.Bently, "Principles of Measurement Systems", 3rd edition.

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EET11:POWER SYSTEMS-I

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Economic aspects of power stations- Types of loads-Load curve, load duration and integrated load duration curves-Load factor-Demand factor-Diversity factor-Capacity factor-Utilization and plant use factors. The effect of these factors on generation-Number and size of generating units-Base load and peak load plants-Costs of electrical energy-Types of tariff charges on consumers.

UNIT-II

Inductance and capacitance calculations of transmission lines-Line conductors-Resistance-Inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacings-Composite conductors transposition-Bundled conductors-Effect of earth on capacitance.

UNIT-III

Mechanical design of Transmission lines-catenary curve-Sag tension calculations- Supports at equal levels, supports at different levels, effect of wind and ice loading – stringing chart – sag template – conductor vibrations.

CORONA: Introduction- critical disruptive voltages-Corona loss-factors affecting corona loss-Methods of reducing corona loss-Disadvantages of corona-Inductive interference between power and communication lines

UNIT-IV

AC Distribution - Comparison of AC single phase, 3 phase 3 wire and 3 phase 4 wire systems with DC 2 wire-Types of primary distribution systems-Types of secondary Distribution systems-AC distributors fed at one end and at both ends-Kelvin's law-Limitations of Kelvin's law-Load estimation-Selection voltage of primary distribution-Choice of scheme-Size of feeders, power factor correcting methods.

UNIT-V

Substations- Number and size-Location and installation-The main equipments in substations-Busbar arrangements-Key diagram of a typical primary substation.

Over head line insulators-Introduction-Types of insulators-Potential distribution over a string of insulators-Methods of equalizing the potential, string efficiency-Testing of insulators.

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Text Books:

1. C..L.Wadhawa, "Generation Distribution and utilization of Electrical energy" New Age International

2.C..L.Wadhawa, "Electrical Power systems" New age publications.

3.B.R.Gupta, "Power system analysis and design" third edition, Wheeler publishing.

4.William D.Stevenson "Elements of power system analysis" fourth edition, Mc Grawhill International editions.

5.AR Bergen and Vijay Vittal, "Power system analysis", Pearson education, 2001.

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EET12: ELECTROMECHANICAL ENERGY CONVERSION – II

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

3-Phase transformers: Types of connections, star/delta, delta/star, star/ zig zag star,
Delta/zig zag star connections and their phasor diagrams, Scott connection, open delta operation of 3-phase transformers, operation of 3-phase transformer on unbalanced input supply, testing of 3-pahse transformers

UNIT-II

3-phase Induction motors: Constructional details , 3-phase armature/stator windings, types of 3-phase induction motors, production of rotating magnetic field, principle of operation, torque equation , starting torque, maximum torque, torque slip characteristics, Phasor diagram, parameters of equivalent circuit.

UNIT-III

Testing of 3-Phase induction motors: Brake test, predetermination of performance from no load and blocked rotor tests, circle diagram.
Methods of starting: star-delta starter, auto transformer starter, Rotor resistance starter.

UNIT-IV

Speed control of 3-phase induction motors: Pole changing, Cascade connection, injection of emf in to rotor circuit, introduction to V/f control of 3-phase induction motor
Double cage induction motor, induction generator and its applications

UNIT-V

Single Phase induction motors: Principle of operation: double revolving field theory, cross field theory, equivalent circuit and determination of parameters
Starting methods: split phase starting, shaded pole starting, Repulsion starting, Universal motor

Text Books:

1. I.J.Nagrath ,D.P.Kothari, "Electric Machines", New Age International Ltd.
2. B.R.Gupta, Vandana Singhal, "Fundamentals of Electrical Machines", New Age International Ltd.
3. Puchstein , Lloyd, Conrad , "Alternating current Machines"

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5th Semester

EET13: LINEAR CONTROL SYSTEMS

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT–I

Introduction : System representation- Classification of systems- control system-Control system technologies- Types of control Systems: open loop, closed loop systms- advantages and disadvantages of control systems- examples of open loop and closed loop control systems-transfer functions and limitations

UNIT-II

Mathematical modeling of physical systems : Mathematical modeling and transfer functions of electrical, mechanical and electro-mechanical elements. –Electrical analogues-Block diagram and their reduction techniques-Signal flow graphs- DC servo motors- two-phase a.c. servo motors – synchros.

UNIT-III

Time domain analysis: Inputtest signals, step response of first and second order systems – Time response specifications – steady state error – static error and generalized error coefficients –Control actions- response with proportional, derivative and integral controllers.

UNIT-IV

Stability of control systems: Introduction –Bounded Input –Bounded Output(BIBO)Necessary conditions for stability-Characteristic equation and location of roots in s-plane for stability-Ruth-Hurwitz criterion-Root locus techniques-rules for construction of root loci

UNIT-V

Frequency domain analysis: estimation of frequency domain specifications for a second order system – correlation between time and frequency response – frequency response plots – polar plots – Bode plots - Gain margin and Phase margin. Need for compensators: Lead, Lag, lead-lag compensators,

Text Books:

1. “Automatic Control systems”- by B.C.Kuo, PHI.
2. “Discrete Time Control Systems”: by K.Ogata, Pearson Education. .
3. “Control system Engg” :I.J.Nagrath and M.Gopal, Wiley Eastern Ltd.
4. “Control system Engineering” by NISE, Wiley, 2000.

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ECT57: PULSE& DIGITAL CIRCUITS

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Wave shaping circuits : Types of waveform, characteristics of pulse waveforms, RC low pass and high pass circuits, rise time, tilt, square wave testing of amplifiers, Diode as a switch, Diode clipper and clamper circuits.

UNIT-II

Multivibrators : BJT switch and switching times, Inverter, JFET switch, MOSFET and CMOS switches, BJT Schmitt trigger, Bistable, Monostable and Astablemultivibrators using BJT & triggering methods.

UNIT-III

Time Base circuits : RC sweep circuits, constant current Miller and Bootstrap time base generators using BJTs, UJT relaxation oscillators, Sampling gates.

UNIT-IV

IC Timers &Multivibrators : CMOS multivibrators, integrated circuit TTL multivibrators, 555 timer, Astable and monostable modes, dual timer and its applications.

UNIT-V

Digital Integrated circuits : Evaluation of ICs, Advantantages and classification of ICs. Digital IC characteristics, Digital IC families. DTL, HTL, TTL, ECL, MOS, CMOS and their comparison, Totempole, open collector and Tristate outputs, IC packagings.

Text Books :

1. David A.Bell, “Solid state pulse circuits:, PHI.
2. B.S.Sonde, “Introduction to system design using ICs Wiley Eastern.
3. Taub and Schilling, “Digital Integrated circuits”, Mc Graw-Hill.

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ECT58 :ANALOG AND DIGITAL IC APPLICATIONS

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Operational Amplifier: Ideal op-amp characteristics, internal circuit, differential amplifier and its transfer characteristic, examples of IC op-amps, DC and AC characteristics, Inverting and non-inverting modes of operation, voltage follower.

UNIT-II

Op-Amp Applications: Basic application of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, Op-Amp circuits using diodes, sample & hold circuits, Log and antilog amplifier, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

UNIT-III

Active Filters & Oscillators: Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters. Oscillator types and principle of operation – RC, Wien and quadrature type, triangular wave generator, IC waveform generator (8038), voltage controlled oscillator (566).

UNIT-IV

Timers & Phase Locked Loops: Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT-V

D-A and A- D Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC specifications.

Text Books:

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 1987.

References:

1. S.Salivahanan, V.S.KanchanaBhaaskaran “Linear Integrated circuits”, TMH, 2008.
2. David A. Bell, “Operational amplifiers and Linear ICs”, PHI, EEE, 1997.

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

HUT02 :MANAGEMENT SCIENCE

Instruction : 4 hr / week *Credits : 2* *Assessment : 20 + 20 + 60*

UNIT - I

Concept of Management – Administration, Organisation – Functions of Management, evolution of management thought – Organisation, principles of organization – Types – Organisation charts – Managerial objectives and social responsibilities.

UNIT - II

Corporate planning – Mission, Objectives, and programmes, SWOT analysis – Strategy formulation and implementation – Plant location and Plant layout concepts – Production control .

UNIT - III

Human resources management – Manpower planning – Personnel management – Basic functions of personnel management job evaluation and merit rating – Incentive plans, Marketing, Functions of marketing.

UNIT - IV

Productivity - Batch and mass production – Work study – Basic procedure involved in method study - work measurement – Elements of cost – Methods of calculation of overhead charges – Depreciation.

UNIT - V

Network Analysis to project management – PERT/CPM – Application of network techniques to engineering problems. – Cost Analysis – Project crashing.

Text Books :

1. Principles of management by Koontz and O Donnel.
2. Industrial Engineering and Management by O.P.Khanna.
3. Marketing by Philips Kother
4. PERT/CPM by L.S.Srinath
5. Business policy by Gluck (TMH)

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

EET14 :POWER SYSTEMS-II

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Performance of transmission lines: Representation of lines-Short transmission lines-Medium transmission lines-Nominal pie and T representation of long lines by distributed parameters-Equivalent T and Pie representation of long transmission lines - Evaluation of ABCD parameters of long lines- Ferranti effect.

UNIT-II

Voltage Control-Methods of voltage control-Shunt and series capacitors-synchronous capacitors-Tap changing and Booster transformers-Power flow through a transmission line-Determining phase modifier capacity- Receiving end and Sending end power circle diagrams- Surge Impedence Loading(SIL)

UNIT-III

Under ground cables:- Introduction-The insulation types-Insulating materials for EHV voltage cables-Classification of cables - Parameters of single core cable-Grading of cables-Capacitance of three core belted cable break down of cables-Heating of cables –dielectric loss and Sheath losses-Current rating of cables.

UNIT-IV

Power system transients:Introduction-Circuit closing transients-Sudden symmetrical short circuit analysis of alternator-Recovery transient due to removal of a short circuit-Travelling waves on transmission line –Surge impedance and wave velocity-Specification of travelling waves-Reflections and refractions of waves-Different types of terminations-Forked line-Successive reflections-Beweleys Lattice diagram-Attenuation and Distortion-Arcing grounds.

UNIT-V

Extra high voltage transmission: Introduction-Need for EHV and UHV-Environmental aspects in EHV and UHV lines-Insulation requirements of EHV lines-Functions of static var systems in EHV transmission-Tuned power lines-EHV systems in India.
HVDC transmission: Introduction-Types of DC links-Advantages of DC transmission- -Converter station equipment- -HVDC systems in India.

TEXT BOOKS:

1. “Elements of power system analysis’ by William D.Stevenson. Jr Mc GRAW-HILL International pub. 4th edition.
2. ”Power system analysis and Design” byB.R.Gupta Wheelers publishing 3rd edition.
3. ”Electrical power system” by C.L.WadhwaNewage publications.
4. ”Power system analysis” by Arthur R.Bergen and Vijay Vittal, Pearson education, 2001.

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

EET15: ELECTROMECHANICAL ENERGY CONVERSION -III

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Synchronous generators: Constructional details of synchronous machines, armature windings, emf equation, Armature reaction , concept of leakage flux, synchronous reactance, equivalent circuit ,
Phasor diagram, voltage regulation, determination of regulation by synchronous impedance method, mmf method, ZPF method, ASA method.

UNIT-II

Theory of salient pole machines, phasor diagram, determination of X_d and X_q from Slip test, Expression for power output of salient pole and cylindrical pole synchronous generators, power angle characteristics

UNIT-III

Parallel operation of Synchronous generators: Conditions for parallel operation, Synchronizing , load sharing , operation of alternator with infinite busbars, effect of change of mechanical input, effect of change of excitation. Excitation systems, transient and sub- transient reactances.

UNIT-IV

Synchronous Motors: Principle of operation, methods of starting , Phasor diagram of synchronous motor, variation of current and power factor with excitation , Predetermination of V and inverted V curves, Hunting and use of damper bars, Synchronous condenser and power factor correction, Excitation and power circles

UNIT-V

Stepper Motors: Principle of operation, Variable reluctance stepper motor, permanent magnet stepper motor, Characteristics of stepper motor.
Brushless dc Motors: principle of operation and control
Switched Reluctance Motors: Types of SR motors, principle, production of torque, requirements of power circuit.

Text Books:

1. I J Nagrath , D P Kothari, "Electric Machines" (New Age International Ltd).
2. B R Gupta, Vandana Singhal, "Fundamentals of Electrical Machines" (New Age International Ltd).
3. Puchstein , Lloyd, Conrad , "Alternating current Machines"
4. R.Krishnan, "Switched Reluctance Motors".

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

EET16: ADVANCED CONTROL SYSTEMS

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Linear system design: introduction to controllers - P, PI, and PID controllers design using Bode plot and root locus techniques- comparison of controllers.

UNIT-II

State variable descriptions: Introduction-Comparison of modern control theory and conventional control theory-concepts of state, state variables, state vector, state space representation of physical systems - representation in state variable form, phase variables and canonical variables – Diagonolosation- similarity transfermation

UNIT-III

Controllability and Observability : Definition of controllability – Controllability tests for continuous time systems – Definition of Observability – Observability tests for continuous time systems. Pole placement by state feedback.- Full order and reduced order observers

UNIT–IV

Time response of linear system : Introduction – Solution of state equations – State Transition matrix – Computation of STM-Block diagram approach to Resolvant matrix – Full order and reduced order observers.

Stability : Introduction – Equilibrium points – Stability concepts and definitions – Stability in the sense of Liapunov stability of linear system

UNIT–V

Non linear systems – Introduction – common physical non linearities, Singular points, Basic concepts of phase plane method, construction of phase trajectories by phase plane method. Basic concepts and derivation of describing functions. Stability analysis by describing function method.

Text Books:

1. Ogata, K.. Discrete Time Control Systems, 2nd edition, Pearson eduction.
2. Schultz and Melsa - State functions and linear control systems.
3. M.Gopal – Modern control system theory, TMH.
4. NISE, “Control system Engineering” Wiley, 2000.
5. Richard C.Dorf and R.H.Bishop “Modern control systems” Addison Wesley longman.

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

EET17: MICROPROCESSORS AND MICROCONTROLLERS

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Development of microprocessors, 8086 microprocessor – Architecture, Instruction set, Addressing modes, Interrupt system. Minimum mode 8086 system and timings, Maximum mode 8086 system and timings.

UNIT-II

Assembler directives, Assembly language programs (8086) with Assembler directives for addition, subtraction, multiplication, division etc., sorting and searching, bit manipulation, Programs using look–up tables, Delay subroutines. Stages of software development.

UNIT-III

Data transfer schemes – Synchronous, Asynchronous, Interrupt driven and DMA type schemes, Programmable interrupt controller (8259) and its interfacing, Programmable DMA controller(8257) and its interfacing, Programmable Interval Timer (8253) and its interfacing, Programmable Communication Interface(8251 USART) and its interfacing.

UNIT-IV

Memory interfacing to 8086 – Interfacing various types of RAM and ROM chips, 8255 PPI and its interfacing, ADC and DAC Interfacing, Data acquisition, Waveform generation, Traffic light controller, Stepper motor control, temperature measurement and control.

UNIT-V

8051 Microcontroller – Architecture, Register set, Instruction set, Interrupt structure, timer and serial port operations, Memory and I/O interfacing, Simple Assembly language programs.

Text Books:

1. A.K. Ray and K.M. Bhurchandi, “Advanced Microprocessors and Peripherals”, TMH.
2. Douglas V. Hall, “Microprocessors and interfacing: Programming and hardware”, TMH, 2nd edition.
3. Kenneth J Ayala, “The 8051 Micro Controller Architecture, Programming and Applications”, Pernam International / Thomson Publishers, 2nd Edition, 2005.
4. Ajay V. Deshmukh, “Microcontrollers – theory applications”, Tata McGraw-Hill Compani

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

EET18: POWER SYSTEM ANALYSIS

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Fault studies: Per unit system, Introduction to symmetrical fault analysis-Short circuit capacity of a bus-The short circuit currents and the reactance of synchronous machines-Internal voltages of loaded machines under transient conditions-Expressions for fault MVA interms of per unit and percentage quantities-Need for current limiting reactors and their location-The selection of circuit breakers.

UNIT-II

Introduction to unsymmetrical faults-Symmetrical components- phase shift of symmetrical components in Star-Delta transformer banks-Power in terms of symmetrical components-Unsymmetrical series impedances- sequence impedances and sequence networks-Sequence Networks of unloaded generators-Sequence impedances of transmission lines-Sequence impedances of transformers - Zero sequence networks of 3 phase loads and 3 phase transformer banks-Unsymmetrical fault analysis on unloaded generator and on power systems with and without fault impedances.

UNIT-III

Load flow studies: Need for load flow studies in a power system-Formation of Bus admittance matrix-Classification of types of buses in a power system-Formulation of load flow equations-Gauss-Seidel, iterative method for load flow studies-Treatment of PV bus-Acceleration factors-Newton Raphson method for load flow solution with rectangular and polar coordinates- formulation of load flow equations-Decoupled and fast decoupled load flow

UNIT-IV

Stability studies: Classification of stability studies-The power flow equations of round rotor and salient pole synchronous machine connected to infinite bus through a transmission system under steady state and transient state - Power flow equations of a two machine system - Power flow equations in terms of ABCD constants-Power angle diagrams-Derivation of swing equation, Inertia constant. steady state stability analysis: Steady state stability and steady state stability limits.

UNIT-V

Transient stability analysis: General considerations and assumptions-Transient stability and stability limits-Reduction of two finite machine system to one machine system-Solution of swing equation of one machine system by point by point method-Digital solution by numerical methods-Equal area criterion-Limitations of equal area criterion- Determination of critical clearing angle. methods for improving power system stability.

Text Books:

1. "Elements of power system analysis ", 4 ed, William .D. Stevenson Jr., MGH International.
2. "Electrical power systems" by C.L.Wadhwa ,New Age International publications.
3. "Power system analysis" by HadiSaadat ,MGH International.
4. "Power system analysis" by AR Bergen and Vijay Vittal, Pearson education Asia, 2001.
5. "Modern Power System Analysis"byNagrath and Kothari

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

EET19: POWER ELECTRONICS

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Silicon controlled Rectifier – Static characteristics and ratings – turn-ON and turn-OFF mechanism – Gate characteristics – Series and parallel operation of SCR's static and dynamic equivilisation circuits – Protection circuits – Design of snubber circuit – Class A,B,C,D,E types of commutation circuits.

II.Triac – construction details – Triggering mechanism – Phase control circuit –Applications. Introduction to GTO, LASCR, SUS, MOSIGT, IGBT.

UNIT-II

Phase controlled Rectifiers - Principles of phase control – Half-wave and full- wave controlled rectifiers with resistive, inductive and RLC load – Free wheeling diode operation – Bridge rectifiers – Single phase and three phase Rectifiers with inductive load – Half and fully controlled rectifiers – free wheeling diode operation – Effect of source inductance – Single quadrant, two quadrant and four quadrant operation of converters – Dual converter – circulation and non-circulating current mode of operation.

UNIT-III

Choppers – D.C.Choppers – Principles of operation – control strategies, constant and variable frequency system, current limit control – Types of chopper circuits – Typer-A, Type B and Type E chopper circuits Morgan chopper Jone's chopper – step-up and multiphase chopper circuits – load commutated chopper.

UNIT-IV

Inverters – Classification – series and parallel inverters improved series inverters – Bridge inverters – Commutation circuits – current and voltage commutation circuits – single phase and three phase inverters – output waveform control – Design of OTT filter – Mc Murray and Inverter – Introduction to current source inverters.

UNIT-V

Cyclo-converters – Principle of operation – single phase step-up and step down cycloconverters – Three-phase half-wave cycloconverters – output voltage equation – circulation and non-circulating current mode of operation – Load commutated cycloconverter.

Speed control – Speed control of DC motors using controlled rectifiers and choppers – Speed control of induction motors using inverters – step-recovery scheme – Rotor ON-OFF control.

Text Books:

1. An introduction to Thyristors and their application – Dr.M.Ramamoorthy – East West press.
2. Power Electronics - Dr.P.S.Bimbhra 2nd edition – Khanna publishers.
3. Power Electronics – M.D.SINGH and K.B.KHANCHANDANI – Tata Mc.Graw Hill publishers.
4. Industrial and power Electronics – RASHID(3rd Edition)

HUT03: ECONOMICS

Instruction : 2 hr / week *Credits : 2* *Assessment : 40 + 60*

UNIT-I

Introduction - Nature and Scope of Managerial Economics, Economic Theory and Managerial Economics, Managerial Economist: Role and Responsibilities.Demand Analysis and Forecasting – Demand Determinants, Demand Distinctions, Demand Forecasting: General Considerations, Methods of Demand Forecasting.

UNIT-II

Cost Analysis – Cost Concepts, Classifications and Determinants; Cost-Output Relationship, Economies and Diseconomies of Scale, Cost Control and Cost Reduction.
Production and Supply Analysis – Production Functions, Supply Analysis.

UNIT-III

Price and Output Decisions Under Different Market Structures – Perfect ompetition, Monopoly and Monopsony; Price Discrimination, Monopolistic Competition, Oligopoly and Oligopsony.

UNIT-IV

Pricing Policies and Practices – Pricing Policies, Pricing Methods, Specific Pricing Policies, Price Discounts and Differentials; Product-line Coverage and Pricing; Price Forecasting.

UNIT-V

Profit Management – Nature of Profit, Measuring Accounting Profit,Profit Policies, Profit Planning and Forecasting.Capital Management - Capital Budgeting, Cost of Capital, Appraising Project Profitability, Risk, Probability and Investment Decisions.

Text Book:

1. Varshney R L and Maheshwari K L, Managerial Economics, 19th Edition, Sultan Chand and Sons, 2009.

References :

1. Froeb L M, and McCann B T, Managerial Economics*:* A Problem SolvingApproach, Cengage Learning, 2008.

HUT04: ACCOUNTANCY

Instruction : 2 hr / week *Credits : 2* *Assessment : 40 + 60*

UNIT-I

Management Accounting – Definition, Objectives, Scope and Functions.Financial Accounting – Introduction, Process, Principles and Concepts.Financial Statements – Trading Account, Balancing Process, Profit & Loss Account and Balance Sheet.

UNIT-II

Financial Statement Analyses – Trend Percentage Analysis, Ratio Analysis, Fund Flow Statement Analysis, Cash Flow Statement Analysis.

UNIT-III

Methods of Depreciation – Straight line, Depletion, Machine Hour Rate, Diminishing Balance, Sum of Digits, Sinking Fund and Insurance Policy Methods.Inventory Valuation Methods – FIFO, LIFO, Average Weighted Average, Base Stock and HIFO Methods.

UNIT-IV

Capital Budgeting – Pay Back Period, ARR, NPV, PI and IRR Methods.Unit Costing – Introduction, Direct Cost Classification and Indirect Cost Classification. Introduction to Process Costing, Job Costing and Activity Based Costing

UNIT-V

Marginal Costing – Introduction, Definition, Meaning and BEP Analysis and BEP in units.Standard Costing – Introduction, Variance Analysis Material Cost Variance, Material Price Variance, Labor Variance, and Sales Variance.Budgetary Control – Introduction and Classification of Budgets, Production, Material / Purchase, Sales, Sales Overhead, Cash and Factory Overheads Budgets. Flexible Budget.

Text Book:

1. Pandikumar M P, Management Accounting*:* Theory and Practice, 1st Edition, Excel Books, 2007.

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

RENEWABLE ENERGY SOURCES (Open Elective)

Instruction : 3hr / week *Credits : 3* *Assessment : 20 + 20 + 60*

Unit-I

Introduction to Energy Sources: Energy sources and their availability, Non-renewable reserves and resources; renewable resources, Transformation of Energy,Energy scenario in India.

Unit II

Solar energy:-Basic characteristics of sunlight – solar energy resource –Solar processes and spectral composition of solar radiation; Radiation flux at the Earth's surface. Solar collectors, Types and performance characteristics.

Unit III

Solar energy storage :Solar energy storage systems,Solar pond
Applications of Solar energy: Photovoltaic cell-characteristics -equivalent circuit- Photovoltaic effect – photo voltaic for battery charging-applications.

Unit-IV

Biomass Energy Systems - Biomass sources-production processes- Gasification, Anaerobic Digestion, Pyrolysis, Boigas- Performance analysis and testing

Unit-V

Wind energy- Wind Distribution – principles of wind energy conversion –basic components of wind energy conversion-advantages and disadvantages- Principles of Operation of wind turbines, types of wind turbines and characteristics, Generators for Wind Turbines,Control strategies.

References

1.**G.D.Rai** "Non Conventional Energy sources",Khanna Publishers,Newdelhi,1999.
2.**G.N.Tiwari and M.K.Ghosal** , "Renewable energy resources,Basic Principles and applications",Narosa Publishing house,Newdelhi.
3.**S.N.Badra,D.Kastha and S.Banerjee** "Wind electrical Systems",Oxford university press,Newdelhi.
4.**M.V.R.koteswara Rao** "Energy resources Conventional & Non conventional" BS publications-Hyderabad,2004
5.**Gilbert M.Masters** "Renewable and Efficient electric power systems" Wiley interscience Publications,2004.

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

7th Semester

EET20: POWER SYSTEM OPERATION & CONTROL

Instruction : 4 hr / week *Credits : 4* *Assessment : 40 + 60*

UNIT-I

Economic operation of power systems: Introduction – operating cost of a thermal plant – Economic dispatch neglecting losses and no generation limits –Economic dispatch including losses – derivation of loss formula - Hydroelectric power plant model – Scheduling of hydropower plant.

UNIT-II

Unit commitment and optimal power flow constraints of unit commitment problem – Solution methods of unit commitment – priority list methods – Dynamic programming approach to solve the unit commitment problem - optimal power flow solution – Elementary treatment of optimal power flow with and without constraints

UNIT-III

Load frequency control: The load frequency control problem – Basic P-f and Q-V control loops of a synchronous generator – Governor model- prime mover model – Generator model – Load model – concept of Single & Multi area power systems – Block diagrams representation of an isolated single area power system – steady state and dynamic responses of uncontrolled and proportional plus integral control of single area power system – load frequency control of two-area power system – Tie line bias control.

UNIT-IV

Automatic voltage regulator – introduction - modeling of amplifier, exciter, Generator and sensor – A simplified AVR block diagram – Excitation system stabilizer – Rate feedback and PID controller – automatic excitation generation control with system – placement and optimal feed-back design.

UNIT-V

Voltage stability and reactive power control, voltage stability problems in a power system – over flow of reactive power control – control of reactive power flow on a line – load compensation – specification of load compensator – uncompensated and compensated transmission lines.

Text Books:

1. “Power system analysis” by HadiSaadat, Tata Mc Grawhill International.
2. “Modern power system analysis” by J.Nagarath& DP Kothari, Tata Mc Grawhill second edition
3. “Power system analysis and design” by B.R.Gupta wheeler publishing
4. “Electrical energy system theory” by O.I.Elgerd Tata Mc Grawhill Ltd second edition.

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

EET21: POWER SEMICONDUCTOR CONTROLLED DRIVES

Instruction : 4 hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT-I

Electrical Drives – An introduction – Electrical Drives, Advantages of Electrical Drives, parts of electrical drives – Electrical motor, power modulators, sources, control unit, choice of electrical drives, status of dc and ac drives.

Dynamics of Electrical Drives – Fundamental Torque equations, speed torque convention and multiquadrant operation, Equivalent values of drive parameters – Loads with rotational motion, loads with translational motion, measurement of moment of inertia. Components of load torques, Nature and classification of load torques, calculation of time and energy loss in transient operation, steady state stability, load equalization.

UNIT-II

Control of electrical drives – Modes of operation, speed control and drive classifications closed loop control of drives.

D.C.motor drives – Starting, Braking, speed control - Armature voltage control, Ward Leonard drives, controlled rectifier fed DC drives – Single phase and 3-phase fully controlled and half controlled converter fed separately excited D.C.motor, chopper – Controlled DC drives.(separately excited motor).

UNIT-III

Induction Motor Drives : Review of three phase I.M., analysis and performance. Operation with unbalanced source voltages and single phasing, analysis of I.M. fed from Non-sinusoidal voltage supply. Starting, Braking, Transient analysis.

UNIT-IV

Speed control methods of IM, v/f controlled induction motors, controlled current and controlled slip operation, PWM inverter drives, Multi-quadrant drives and field oriented control, slip power control,single phase I.M. Close loop control of I.M. Drives.

UNIT-V

Synchronous motor drives: cylindrical rotor wound field motor, salient pole wound field motor, synchronous reluctance motor, Hysteresis synchronous motor, operation from fixed frequency supply, starting, braking, synchronous motor ,variable speed drives, starting large synchronous machines.

Energy Conservation in electrical drives – Losses in electrical drive system, measures of energy conservation in electrical drives, use of efficient converters, energy efficient operation of drives, improvement of p.f., improvement of quality of supply, maintenance of motors.

Text Books:

1. G.K.Dubey – Fundamentals of Electrical drives.
2. VedamSubrahmanyam - Electrical drives – Concepts and applications.

EET22: UTILIZATION OF ELECTRICAL POWER

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

Instruction : 3hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT–I

Illumination: Nature of light, definitions, Laws of illumination, different types of lamps, construction and working of incandescent lamp, fluorescent lamp and discharge lamps, Illumination schemes; indoor and outdoor, Illumination levels. General ideas about street lighting, building lighting.

UNIT–II

Electric Heating: Advantages of electrical heating, Heating methods: Resistance heating, Induction heating, Electric arc heating, construction and working of arc furnace, Dielectric heating, Infra-red heating, Microwave heating, design problems of resistance heating element.

UNIT –III

Electric Welding: Advantages of electric welding, Welding methods, Principles of resistance welding, welding equipments used, Principle of electric arc welding, carbon arc, metal arc, hydrogen arc welding methods and their applications. Advantages of using coated electrodes, comparison between AC and DC arc welding, welding control circuits.

UNIT –IV

Electric Drives: Introduction, Advantages of electric drives, Characteristics of different mechanical loads, Types of motors used in electric drive, types of braking, Methods of power transfer, selection of motors for different types of domestic loads.

UNIT –V

Electric Traction: Advantages of electric traction, Different systems of electric traction, DC and AC systems, diesel electric system, types of services – urban, sub-urban, and main lines and their speed-time curves, pentagraph, Factors affecting scheduled speed, types of motors used for electric traction, Starting and braking of traction motors.

Text Books :

1. Art and Science of Utilization of Electrical Energy by H Partap, Dhanpat Rai &Sons, Delhi.
2. Utilization of Electrical Energy by JB Gupta, Kataria Publications, Ludhiana.
3. A.Text Book. of Electrical Power by Dr. SL Uppal, Khanna Publications, Delhi.
4. Modern Electric Traction by H Partap, Dhanpat Rai & Sons, Delhi.
5. Utilization of Electrical Energy by OS Taylor, Pitman Publications.
6. Generation, Distribution and Utilization if Electrical Power by CL Wadhwa, Wiley Eastern, Ltd., New Delhi.

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

EET23: POWER SYSTEM PROTECTION

Instruction : 3hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT–I

Protection against over voltages: Causes of over voltages-over voltages due to lightning – Rod gaps-Horn gaps-Expulsion type and valve type lightning arresters-lightning arrester calculations-ground wires-counter poises-surge absorbers and surge diverters. Basics of Insulation coordination - Power system earthing.

UNIT-II

Fuses: Definitions, characteristics, types, HRC fuses.
Circuit breakers: Introduction - Formation of Arcs in CBs - arc interruption theories - Definitions - Current chopping - Classification of circuit breakers - Oil circuit breakers- Air blast circuit breaker - SF6 circuit breaker-Vacuum circuit breaker - Testing of circuit breakers.

UNIT–III

Protective Relaying fundamentals: Introduction – Need for protective systems in a power system – Zones of protection - Primary and backup protection – definition and functional characteristics of a protective relay – operating principles of various electromagnetic relays.

UNIT-IV

Types of Protective Relays: Overcurrent relays – Directional overcurrent relays – applications of over current relays. Distance relays: the universal torque equation – impedance, reactance and mho relays - differential relays – percentage differential relays – Static relays.

UNIT–V

Generator Protection: Protection against stator faults, against rotor faults and against abnormal conditions.
Transformer Protection: Buchholtz relay, differential protection, percentage differential protection.
Busbar protection:- Frame leakage protection scheme

Text Books:

1. BadriRam&D.N.Vishwakarma – Power system protection and switch gear., TMH publishing Company Ltd. 1995.
2. C.L.Wadhwa – Electrical power systems, Wiley Eastern Ltd.
3. B.Ravindranath&M.Chander, power system protection & switch gear., Wiley Eastern Ltd.

EEL01: ELECTIVE-II

OPTIMIZATION TECHNIQUES

Instruction : 3hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT-I

Linear programming –formulation-Graphical and simplex methods-Big-M method-Two phase method-Dual simplex method-Primal Dual problems.

UNIT-II

Unconstrained one dimensional optimization techniques -Necessary and sufficient conditions – Unrestricted search methods-Fibonacci and golden section method-Quadratic Interpolation methods, cubic interpolation and direct root methods.

UNIT-III

Unconstrained n dimensional optimization techniques – direct search methods –Random search –pattern search and Rosen brooch's hill claiming method- Descent methods-Steepest descent, conjugate gradient, quasi -Newton method

UNIT-IV

Constrained optimization Techniques- Necessary and sufficient conditions –Equality and inequality constraints-Kuhn-Tucker conditions-Gradient projection method-cutting plane method- penalty function method

UNIT-V

Dynamic programming- principle of optimality- recursive equation approach-application to shortest route, cargo-loading, allocation and production schedule problems

Text Books:

1. Rao, S.S., 'Optimization :Theory and Application' Wiley Eastern Press, 1978.
2. Taha, H.A., Operations Research –An Introduction, Prentice Hall of India.
3. Fox, R.L., 'Optimization methods for Engineering Design', Addition Welsey, 1971.

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

ELECTIVE-II :ENERGY MANAGEMNT

Instruction : 3hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT-I

Principles of energy management – Organising an energy management program – Initiating and managing an energy management program - Planning - Leading – Controlling – Promoting – Monitoring and reporting.

UNIT-II

Energy Auditing – Definitions and concepts – Types of plant energy studies – Energy index – Cost index – Pie charts – Sankey diagrams – Load profiles – Energy conservation – Energy conservation schemes – Energy Audit – Energy saving potential.

UNIT-III

Electrical energy management – Energy efficient motors – Power factor improvement – Lighting and lighting system control – Energy saving opportunities.

UNIT-IV

Qualities and functions of energy managers – Language of an energy manager – questionnaire - Check list for top management.

UNIT-V

Economic Analysis – Depreciation methods - Time value of money – Evaluation methods of projects – Replacement analysis – Special problems – Inflation – Risk analysis.

Text Books :

1. "Energy Management" - W.R.Murphy&G.Mckey Butterworths.
2. "Energy Conservation" - Pa ulO'Callagan - Pergamon press.
3. "Energy Management Hand Book" - W.C.Turner, John Wiley and Sons.
4. "Energy Management Principles" – Craig B Smith – Pergamon press.

BTechEEE(wef 2016-17 admitted batch)
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ELECTIVE-II :SOFT COMPUTING TECHNIQUES

Instruction : 3hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT-I

Artificial Neural Networks: Introduction to neural networks, biological neurons, artificial neurons, McCulloch-Pitt's neuron model, neuron modeling for artificial neural systems, feed forward network, perceptron network , Supervised and un-supervised learning.
Learning Rules: Hebbian learning Rule, Perceptron learning Rule, Delta learning Rule, Winner-take-all learning rule, Out-star learning rule.

UNIT-II

Supervised Learning: Perceptrons, exclusive OR problem, single layer perceptron network, multi-layer feed forward networks: linearly non separable patter classification, delta learning rule for multi perceptron layer, error back propagation algorithm, training errors.Un-Supervised Learning**:** Hamming net, Max net,. Winner –take –all learning, counter propagation network, feature mapping, self-organising feature maps

UNIT-III

Fundamentals of fuzzy logic and fuzzy sets: Definition of fuzzy set , a-level fuzzy set , cardinality, operations on fuzzy sets: union, intersection, complement, Cartesian product, algebraic sum, definition of fuzzy relation, properties of fuzzy relations, fuzzy composition.

UNIT-IV

Design of Fuzzy Systems: Components of fuzzy systems, functions of fuzzification, Rule base patterns, Inference mechanisms, methods of de-fuzzification: COG,COA, MOM, Weighted average, height methods.

UNIT-V

Neuro-Fuzzy Modeling: Adaptive networks based Fuzzy interface systems –classification and regression trees – data clustering algorithms – rule based structure identification – Neuro-Fuzzy controls – simulated annealing – evolutionary computation. Introduction to Genetic Algorithms.

Text Books:

1. Jacek M Jurada, " Introduction to artificial Neural Systems", Jaico Publications
2. Zimmerman, " Fuzzy Set Theory and its Applications" , Kluwer Academic Publishers
3. Timothy Ross, " Fuzzy Logic with Engineering Applications" ,(Mc GrawHill)S.Rajasekaran, G.A. VijayalakshmiPai,"Neural Networks, Fuzzy logic & Genetic Algorithms", PHI, New Delhi

BTechEEE(wef 2016-17 admitted batch)
Common to EAMCET stream and Dual Degree Stream

ELECTIVE-II :ELECTRICAL DISTRIBUTION SYSTEMS

Instruction : 3hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT-I

Introduction to distribution systems: an overview of the role of computers in distribution system planning. Load modeling and characteristics. Coincidence factor, contribution factor and loss factor. Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics.

UNIT-II

Distribution Transformers &feeders – Distribution transformer types, regulation and efficiency. Design considerations of distribution feeders – Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system.

UNIT-III

Substations – Introduction – types of substations - main equipments in substations - Busbar arrangements - Key diagram of a typical primary substation - Rating of a distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

UNIT-IV

Protective devices and coordination – Objectives of distribution system protection, Types of common faults and procedure for fault calculations. Protective Devices : Principle of operation of fuses, circuit Reclosurers, line Sectionalizers, and circuit breakers. Coordination of protective devices General coordination procedure.

UNIT-V

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.
Voltage control – Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

Text Books :

1. “Electric power Distribution system Engineering “ – by TuranGonen, Mc Graw-Hill book company.

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ELECTIVE-II :MEMS

Instruction : 3hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT-I

Introduction: history of MEMS, market for MEMS, overview of MEMS processes properties of silicon, a sample MEMS process. Basics of Micro technology: definitions and terminology, a sample process, lithography and etching. MEMS Biosensors: Bio Flow Sensors, MEMS Images. Introduction to MEMS Pro design software.

UNIT-II

Micromachining: subtractive processes (wet and dry etching), additive processes (evaporation, sputtering, epitaxial growth). Fundamental Devices and Processes: basic mechanics and electrostatics for MEMS, parallel plate actuators, pull-in point, comb drives.

UNIT-III

Fundamental Devices and Processes: more electrostatic actuators; MEMS foundries, Cronos MUMPs (multi user MEMS process). MUMPs Multi User MEMS Process: JDS Uniphase MUMPs processing sequence and design rules. MUMPs and SUMMIT: design rules; applications; micro hinges and deployment actuators.

UNIT-IV

CMOS MEMS : CMOS foundry processes, integrated IC/MEMS, MEMS post processing, applications. Clean room lab techniques: clean rooms, gowning procedures; safety, fire, toxicity; acids and bases; photolithography.

UNIT-V

MicroOptoElectroMechanical Systems (MOEMS): micro scanners, digital mirror display, retinal scanning display. Grating light valve, corner cube retroreflector, optical switches,other Micro-optical devices.

TextBooks:

1. HSU, TAI RAN, MEMS and Microsystems Design and Manufacture, TataMc Graw-Hill,2002.
2. Rai-Choudhury, Prosenjit; Mems and Moems Technology and Applications SPIE,2000.

EEL02: ELECTIVE-III
POWER QUALITY

Instruction : 3 hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT –I

Electric power quality phenomena- IEC and IEEE definitions - power quality disturbances- voltage fluctuations – transients – unbalance - waveform distortion - power frequency variations.

UNIT–II

Voltage variations, Voltage sags and short interruptions – flicker-longer duration variations - sources – range and impact on sensitive circuits-standards – solutions and mitigations – equipment and techniques.

UNIT–III

Transients – origin and classifications – capacitor switching transient – lightning-load switching – impact on users – protection – mitigation.

UNIT –IV

Harmonics – sources – definitions & standards – impacts - calculation and simulation – harmonic power flow - mitigation and control techniques – filtering – passive and active.

UNIT–V

Power Quality conditioners – shunt and series compensators-DStatcom-Dynamic voltage restorer-unified power quality conditioners-case studies.

Text Books:

1. Bollen, M.H.J., 'Understanding Power Quality Problems: Voltage sags and interruptions', IEEE Press, New York, 1999.
2. Arrillaga, J, Watson, N.R., Chen, S., 'Power System Quality Assessment', Wiley, New York, 1999.
3. Heydt, G.T., 'Electric Power Quality', Stars in a Circle Publications, Indiana, 1991.

ELECTIVE-III :SPECIAL MACHINES

Instruction : 3hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT-I

Field aspects of electrical machines: Review of Maxwell's equations and solution of Laplace's and Poisson's equations., Concept of magnetic vector potential. Eddy current braking.Linear motors: Basic principle of operation and types. End effects & transverse edge effects. Field analysis & Propulsion force; equivalent circuit.

UNIT-II

Stepper motors: Construction and operation of Stepper Motors: variable reluctance, permanent magnet, hybrid stepper motors, characteristics of stepper motors.Drive Circuits for Stepper motors: Block diagram of stepper motor controller, logic sequence generator, power drivers, current suppression circuits, acceleration and deceleration circuits.

UNIT-III

Microprocessor control of stepper motors: microprocessor based stepper motor controller, PC based stepper motor controller.Micro-stepping Control of Stepper motors: the micro-stepping principle, advantages of micro stepping, design of basic micro-stepping controller.Applications of stepper motor

UNIT-IV

Brushless DC motor: principle of operation of BLDC motor, squre wave permanent magnet brushless motor drives, sine wave permanent magnet Brushless DC motor drives, phasor diagram, torque speed characteristics, controllers for BLDC motors, alternating current drives with PM and synchronous reluctance hybrid motors.

UNIT-V

Switched Reluctance Motor Drives: Types of SR motors , principle of operation, static torque production, energy conversion loop, dynamic torque production. Converter Circuits, Control of SR motors: current regulation, commutation, torque speed characteristics, shaft position sensing.

Text Books :

1. "V VAthani, " Stepper Motors Fundamentals, Applications, and Design", New Age.
2. TJE Miller, " Brushless Permanenet-Magnet and Reluctance Motor Drives" Clarendon Press , Oxford .

ELECTIVE-III :FLEXIBLE AC TRANSMISSION SYSTEMS

Instruction : 3hr / week | *Credits : 3* | *Assessment : 40 + 60*

UNIT-I

Flexible Ac Transmission System: Transmission inter connections, flow of power in ac systems, loading capability, dynamic stability considerations, basic types of FACTS controllers.

UNIT-II

Static Shunt Compensators: Objectives of shunt compensation, static var compensators, STATCOM configuration, characteristics and control, comparison between STATCOM and SVC.

UNIT-III

Static Series Compensation: Objectives of series compensation, Variable Impedance type series compensators, switching converter type series compensators, external control for series reactive compensators.

UNIT-IV

UPFC: Principle of operation and characteristics, independent active and reactive power flow control, comparison of UPFC with the series compensators and phase angle regulators.
IPFC: Principle of operation and characteristics and control aspects.

UNIT-V

Static voltage regulators and phase shifters: Introduction**,** Principles of operation-Steady state model and characteristics - power circuit configurations

Text Books :

1. Hingorani ,L.Gyugyi,‘ Concepts and Technology of flexible ac transmission system’, IEEE Press New York, 2000.
2. K.R.Padiyar, “FACTS controllers in power transmission and distribution”, New age International Publishers, Delhi, 2007.
3. R .Mohan Mathur and Rajiv K.Varma , ‘Thyristor - based FACTS controllers for Electrical transmission systems’, IEEE press, Wiley Inter science, 2002.

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ELECTIVE-III :DIGITAL SIGNAL PROCESSING

Instruction : 3hr / week *Credits : 3* *Assessment : 40 + 60*

UNIT-I

Signals and signal processing : Characterization and classification of signals, Typical signal processing operations, Typical signal processing applications , Advantages of digital signal processing

UNIT-II

Time domain representations of signals and systems: Discrete time signals , Operations on sequences, Discrete time systems, Linear time invariant discrete time systems Characterization of LTI systems

UNIT-III

Transform domain representation of signals and systems :The discrete time Fourier transform, The frequency response, The transfer function, Discrete Fourier series Discrete Fourier transform, Computation of DFT, Linear convolution using DFT The z-transform, The region of convergence of z-transform.

UNIT-IV

Structures for discrete time systems: Block diagram and signal flow representation of constant coefficient ,linear difference equation, Basic structures for IIR systems Basic structures for FIR systems, Lattice structures, Effects of coefficient quantization Effect of round off noise in digital filters, Zero-input limit cycles

UNIT-V

Filter design techniques: Design of discrete time IIR filters from continuous time filters Design of FIR filters by windowing, Optimum approximation of FIR filters, Linear phase filters

Text Books :

1. Oppenheim,A.V, Wilskey,A.S, and Young, I.T, "Signals and Systems", Prentice-Hall of India.
2. Digital Signal processing by A.V.Oppenheim and R.W.Schafer, Prentice – Hall of India, New Delhi, 1988.
3. Digital signal processing by William D.Stanley, Reston publishing company, Reston, Virginia, 1975.
4. Digital signal processing computer based approach, S.K.Mitra – Tata Mc Graw-Hill (III)

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EEL03:
ELECTIVE-IV(e-Learning NPTEL Courses: syllabi prescribed as in NPTEL)

1. *Emebbed Systems*
2. *Advanced Power Electronics*
3. *Digital Image Processing*
4. *Nano Electronics*
5. *High Voltage DC Transmission*

EEL04: ELECTIVE-V

*MOOCS :*one course to be selected by student among the list prescribed by the department
(to be completed by end of 7^{th}sem , Certificate has to be submitted in 8^{th}Sem)

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