

EE501 POWER TRANSMISSION AND DISTRIBUTION

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	SUPPLY SYSTEMS	Basic network of power system. Transmission and distribution voltage, effect of system voltage on size of conductor and losses. Comparison of DC 2- wire, DC 3- wire, 1- phase AC and 3- phase AC (3- wire and 4- wire) systems. (ii) Distribution Systems: - Primary and secondary distribution systems, feeder, distributor and service mains. Radial and ring- main distribution systems. Kelvin's law for conductor size.
II	MECHANICAL FEATURES OF OVERHEAD LINES	Conductor material and types of conductor. Conductor arrangements and spacing. Calculation of sag and tension, supports at different levels, effect of wind and ice loading, stringing chart and sag template. Conductor vibrations and vibration dampers.
III	PARAMETERS OF TRANSMISSION LINES	Resistance inductance and capacitance of overhead lines, effect of earth, line transposition. Geometric mean radius and distance. Inductance and capacitance of line with symmetrical and unsymmetrical spacing Inductance and capacitance of double circuit lines. Skin and proximity effects. Equivalent circuits and performance of short and medium transmission lines.
IV	INSULATORS	Pin, shackle, suspension, post and strain insulators. Voltage distribution across an insulator string, grading and methods of improving string efficiency. (ii) Underground Cables: Conductor, insulator, sheathing and armoring materials. Types of cables. Insulator resistance and capacitance calculation. Electrostatic stresses and reduction of maximum stresses. Causes of breakdown. Thermal rating of cable. Introduction to oil filled and gas filled cables.
V	LINE CONSTANTS AND CORONA	Generalized ABCD line constants, equivalent circuit and performance of long transmission line. Ferranti effect. Interference with communication circuits. Power flow through a transmission line (ii) Corona: Electric stress between parallel conductors. Disruptive critical voltage and visual critical voltage, Factors affecting corona. Corona power loss. Effects of corona.

EE502 POWER ELECTRONICS-I

Teaching Hrs.
L-3, T-1, P-0

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topic	Details of Coverage
I	POWER SEMICONDUCTOR DEVICES	Characteristics of power transistor, thyristor, GTO, Triac, Diac, MCT, operation and switching characteristics of snubber, IGBT, power MOSFET, Two Transistor model of Thyristor.
II	SCR	Construction and characteristics of thyristor, turn-on methods of SCR, turn-on switching characteristics, turn-off methods, rating of thyristor, protection of SCR-voltage and current protection, fusing and crow-bar protection, UJT relaxation oscillator, pulse transformer, optical isolators.
III	CONVERTERS-I	Single Phase half & full wave controlled converters with resistive and inductive load, Single phase dual converters, Three phase half wave converters, Three phase full converters with RL load, Three phase dual converters.
IV	CONVERTERS-II	Single and three-phase semi converters with RL load. Power Factor Improvement-Extinction angle control, symmetrical angle control, phase angle control, asymmetrical firing, pulse width modulation control and sinusoidal pulse width modulation control, Effect of load and source impedances.
V	DC CHOPPERS	Principle of Step Up/Down Chopper, Chopper Configurations-single, two, four quadrant chopper, Thyristor commutation in chopper, multiphase chopper, Switched Mode Regulators-buck, boost, buckboost and cuk regulator.

EE 503 MICROPROCESSOR & COMPUTER ARCHITECTURE

Teaching Hrs.
L-3, T-0, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	INTRODUCTION	CPU, address bus, data bus and control bus. Input/Output devices, buffers, encoders, latches and memories. Brief introduction to comparison of different features in 8085 and 8086 microprocessors.
II	8085 MICROPROCESSOR ARCHITECTURE	Internal Data Operations and Registers, Pins and Signals, Peripheral Devices and Memory Organization, Interrupts.
III	8085 MICROPROCESSOR INSTRUCTIONS	Classification, Format and Timing. Instruction Set. Programming and Debugging, 8 Bit And 16 Bit Instructions.
IV	8085 MICROPROCESSOR INTERFACING	8259, 8257, 8255, 8253, 8155 chips and their applications. A/D conversion, memory, keyboard and display interface (8279).
V	BASIC COMPUTER ARCHITECTURE	Central Processing Unit, memory and input/output interfacing. Memory Classification: Volatile and non-volatile memory, Primary and secondary memory, Static and Dynamic memory, Logical, Virtual and Physical memory. Types of memory: Magnetic core memory, binary cell, Rom architecture and different types of ROM, RAM architecture, PROM, PAL, PLA, Flash and Cache memory, SDRAM, RDRAM and DDRAM. Memory latency, memory bandwidth, memory seek time.

EE504 CONTROL SYSTEM ENGINEERING

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	INTRODUCTION	Elements of control systems, concept of open loop and closed loop systems. Examples and application of open loop and closed loop systems, brief idea of multivariable control systems.
II	MATHEMATICAL MODELING OF PHYSICAL SYSTEMS	Representation of physical system (Electro Mechanical) by differential equations, Determination of transfer function by block diagram reduction techniques and signal flow method, Laplace transformation function, inverse Laplace transformation
III	TIME RESPONSE ANALYSIS OF FIRST ORDER AND SECOND ORDER SYSTEMS	Characteristic equations, response to step, ramp and parabolic inputs, transient response analysis, steady state errors and error constants, Transient & steady state analysis of LTI systems.
IV	STABILITY OF SYSTEMS	Absolute stability and relative stability, Routh's stability criterion, root locus method of analysis, polar plots, Nyquist stability criterion. M and N Loci, Nichols chart.
V	ELEMENTARY IDEAS OF COMPENSATION NETWORKS	Lag, lead and log lead networks, brief idea of proportional, derivative and integral controllers.

EE505 ELECTROMAGNETIC FIELD THEORY

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	INTRODUCTION	Vector-Relation in rectangular, cylindrical, spherical and general curvilinear coordinate system. Concept and physical interpretation of gradient, Divergence and curl, Green's Stoke's and Helmholtz theorems.
II	ELECTROSTATICS	Electric field vectors-electric field intensity, flux density & polarization electric field due to various charge configurations. The potential functions and displacement vector. Gauss's law. Poisson's and Laplace's equation and their solution. Uniqueness theorem. Continuity equation. Capacitance and electrostatics energy, field determination by method of images. boundary conditions. Field mappings and concept of field cells.
III	MAGNETOSTATICS	Magnetic field vector:Magnetic field intensity,flux density & magnetization, Bio-Savart's law,Ampere's law, Magnetic scalar and vector potential, self & mutual inductance, Energy stored in magnetic field, Boundary conditions, Analogy between electric and magnetic field mapping and concept of field cells.
IV	TIME VARYING FIELDS	Faraday's law. Displacement currents and equation of continuity. Maxwell's equations,Uniform plane wave in free space, dielectrics and conductors, skin effect sinusoidal time variations, reflections, refraction & polarization of UPW, standing wave ratio pointing vector and power considerations.
V	RADIATION	Retarded potentials and concepts of radiation, Alternating current element and power radiated by Hertzian dipole. Radiation resistance.

EE506 COMMUNICATION ENGINEERING

Teaching Hrs.
L-3, T-0, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	NOISE EFFECTS IN COMMUNICATION SYSTEM	Resistor noise, Networks with reactive elements, Noise temperature, Noise bandwidth, effective input noise temperature, Noise figure. Noise figure & equivalent noise temperature in cascaded circuits.
II	AMPLITUDE MODULATION	Frequency translation, Recovery of base band signal, Spectrum & power relations in AM systems. Methods of generation & demodulation of AM-DSB, AMDSB/ SC and AM-SSB signals. Modulation & detector circuits for AM systems. AM transmitters & receivers.
III	FREQUENCY MODULATION	Phase & freq. modulation & their relationship, Spectrum & bandwidth of a sinusoidally modulated FM signal, phasor diagram, Narrow band & wide band FM. Generation & demodulation of FM signals. FM transmitters & receivers, Comparison of AM, FM & PM. Pre emphasis & de-emphasis. Threshold in FM, PLL demodulator.
IV	NOISE IN AM AND FM	Calculation of signal-to-noise ratio in SSB-SC, DSB-SC, DSB with carrier, Noise calculation of square law demodulator & envelope detector. Calculation of S/N ratio in FM demodulators, Super-heterodyne receivers.
V	PULSE MODULATION SYSTEM	Sampling theorem, Generation and demodulation methods of PAM, PWM, PPM.

EE511 POWER TRANSMISSION AND DISTRIBUTION LAB

Teaching Hrs.
L-0, T-0, P-2
(40)}

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (60) & University

CONTENTS OF SYLLABUS

S. No. List of Experiments:

- 1 GENERATING STATION DESIGN : Design consideration of hydro & thermal generating stations, Basic schemes of hydro, thermal, nuclear & gas power plants. Auxiliary power supply scheme for thermal power plant. Electrical equipment for power stations.
- 2 DISTRIBUTION SYSTEM DESIGN : Design of feeders & distributors. Types of primary and secondary distribution systems, voltage drops in distributors. Types of primary and secondary distribution system, voltage drop in distributors fed from one end both ends. Kelvin's law. Radial and ring distribution systems. Distribution substations.
- 3 SUBSTATIONS : Basic network of power system, Types of substations, bus-bar arrangements, Electrical equipment for substations.
- 4 INSTRUMENT TRANSFORMERS : Design consideration of CTs & PTs for measurement & protection. Measurement of power using CTs & PTs.

EE512 POWER ELECTRONICS-I LAB

Teaching Hrs.
L-0, T-0, P-2
(40)}

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (60) & University

CONTENTS OF SYLLABUS

- | S. No. | List of Experiments: |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Study the characteristics of SCR: Observe the terminal configuration, Measure the breakdown voltage, Measure latching and holding current and V-I characteristics. |
| 2 | Study the different triggering circuits for SCR: R-triggering circuit, R-C triggering circuit and UJT triggering circuit. |
| 3 | Study the firing circuit for single-phase converters using ramp comparator scheme. |
| 4 | Study the firing circuit for single-phase converters using cosine wave comparator scheme. |
| 5 | Study the firing circuit for single-phase converters using op-amps and gates. |
| 6 | Study and obtain the characteristics of Diac. |
| 7 | Study and obtain the waveforms for single-phase half wave controlled converter. |
| 8 | Study and obtain the wave forms for single-phase fully controlled bridge converter. |
| 9 | Study and show the effect of freewheeling diode in single-phase fully controlled bridge converter. |
| 10 | Study and obtain the waveforms for voltage-commutated chopper. |
| 11 | Study and obtain the waveforms for current-commutated chopper. |

EE513 MICROPROCESSOR LAB

Teaching Hrs.
L-0, T-0, P-2
(40)}

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (60) & University

CONTENTS OF SYLLABUS

S. No. List of Experiments:

- 1 Study the hardware, function, memory structure and operation of DYNA-8085 microprocessor dit.
- 2 Program to perform integer division (i) 8-bit (ii)16-bit by 8-bit.
- 3 Transfer of a block of data in memory to another place in memory.
- 4 Transfer of block to another location in reverse order.
- 5 Searching a number in an array.
- 6 Sorting of array in: (i)Ascending (ii)Descending order
- 7 Finding parity of a 32 bit no.
- 8 Programme to perform following conversion:(i)BCD to ASCII (ii) BCD to Hexadecimal.
- 9 Programme to multiply two 8-bit numbers.
3. Programme to generate and sum 15 fabonacci numbers.
4. Programme for rolling display of message "INDIAN"
5. To insert a number at correct place in a sorted array.
6. Reversing bits of an 8-bit no.
7. Fabrication of 8-bit LED interfaces for 8085 kit though 8155 and 8255
8. Data transfer on output port 8155 & 8255 & designing of discolight, running light, and sequential lights on off by above hardware.
9. Parallel data transfer between two DYNA-85 kits using 8253 ports.
10. Generation of different waveform on 8253/8254 programmable timer.

EE514 ENTREPRENEURSHIP DEVELOPMENT

Teaching Hrs.
L-0, T-0, P-2
(40)}

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (60) & University

CONTENTS OF SYLLABUS

S. No. List of Experiments:

- 1 Definition of entrepreneur, qualities of a successful entrepreneur, Charms of being an entrepreneur, achievement-motivation, leadership and entrepreneurial competencies
- 2 Decision-making, procedures and formalities for starting own business, financial support system.
- 3 Identification and selection of business opportunities and market survey, business plan. Implementation and customer satisfaction.
- 4 Business crises, problem-solving attitude, communication skill. Government policies for entrepreneurs.
- 5 Knowledge based enterprises, Scope of entrepreneur in present context, area of future entrepreneurship
- 6 Marketing & Sales Promotion, Techno-Economic Feasibility Assessment by Preparation of Preliminary & Detailed project report

EE601 ADVANCED MICROPROCESSORS

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	INTRODUCTION TO 8086/8088	Internal architecture of 8086/8088. The Bus interface unit. The execution unit. Pin diagram, addressing modes concepts of virtual memory.
II	ASSEMBLY LANGUAGE PROGRAMMEING OF 8086	Construction of the machine codes for 8086 instructions, Data transfer Instructions, Arithmetic Instructions. Writing simple assembly Language Programmes. Bit manipulation and starting instructions. Implementation of WHILEDO, REPEAT-UNTIL and IF-THEN structures.
III	MICROPROCESSOR SYSTEM PERIPHERALS	Description programming and interfacing of 8279 display and key board controller. 8275 programmable CRT controller, DMA Controller 8257.
IV	SERIAL COMMUNICATION	Basic idea and OF SERIAL COMMUNICATION Description, programming and interfacing of 8251 USART.
V	ADVANCED MICROPROCESSORS	Basic idea and Architecture of 80186, 80286, and 80386.

EE602 HIGH VOLTAGE ENGINEERING

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	BREAKDOWN IN GASES, LIQUIDS & SOLIDS	Introduction to mechanism of breakdown in gases, Townsend's breakdown mechanism. Breakdown in electromagnetic gases. Application of gases in power system. (ii) Breakdown in Liquids: Introduction to mechanism of breakdown in liquids, suspended solid particle mechanism and cavity breakdown. Application of oil in power apparatus. (iii) Breakdown in solids: Introduction to mechanism of breakdown in solids, electromechanical breakdown, treeing & tracking breakdown and thermal breakdown.
II	HIGH DC VOLTAGE GENERATION	Generation of high dc voltage, basic voltage multiplier circuit. (ii) High AC Voltage Generation: Cascaded Transformers. (iii) Impulse Voltage generation: Impulse voltage, basic impulse circuit, Mark's multistage impulse generator. (iv) Measurement of High Voltage: Potential dividers - resistive, capacitive and mixed potential dividers. Sphere gap- Construction and operation. Klydonograph.
III	NONDESTRUCTIVE INSULATION TEST	Measurement of resistivity, dielectric constant and loss factor. High Voltage Schering Bridge- measurement of capacitance and dielectric loss. (ii) Partial Discharges: Introduction to partial discharge, partial discharge equivalent circuit. Basic wide-band and narrow band PD detection circuits.
IV	OVER VOLTAGES	Causes of over voltages, introduction to lightning phenomena, over voltages due to lightning.
V	TRAVELLING WAVES	Travelling waves on transmission lines-open end line, short circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at a T-junction and line terminated through a capacitance. Attenuation of travelling waves.
VI	OVER VOLTAGE PROTECTION	Basic construction and operation of ground wires- protection angle and protective zone, ground rods, counterpoise, surge absorber, rod gap and arcing horn, lightning arresters - expulsion type, non-linear gap type and metal oxide gapless type. (ii) Insulation Coordination: Volt - time curves, basic impulse insulation levels, coordination of insulation levels.

EE603 POWER ELECTRONICS-II

Teaching Hrs.
L-3, T-1, P-0

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topic	Details of Coverage
I	AC VOLTAGE CONTROLLERS	Principle of On-Off Control, Principle of Phase control, Single phase half and full wave bidirectional AC voltage controllers with resistive and inductive load, sequence control of AC regulators, Three Phase full wave AC controllers, AC Voltage Controller with PWM Control.
II	INVERTERS	Voltage Source Inverters-Single phase half bridge and full bridge Inverter with resistive and RL load, three phase inverter with 120° and 180° mode, voltage control of single phase and three phase Inverters. Current Source Inverters, comparison between VSI and CSI, Harmonics and its reduction techniques.
III	CYCLOCONVERTERS	Principle of operation, single phase to single phase, three-phase to three-phase and three phase to single phase cycloconverters. Output equation, Control circuit, load commutated cycloconverters.
IV	DC POWER SUPPLIES	Switched Mode DC Power Supplies, flyback converter, forward converter, half and full bridge converter, resonant DC power supplies, bi-directional power supplies.
V	AC POWER SUPPLIES	Switched mode power supplies, Resonant AC power supplies, bidirectional AC power supplies. Multistage conversions, Control Circuits: Voltage Mode

EE604 POWER SYSTEM INSTRUMENTATION

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	THEORY OF ERRORS	Accuracy and precision, systematic and random errors, limits of error, probable error and standard deviation Gaussian error curves, combination of errors.
II	TRANSDUCERS	Construction & Operating Characteristics of active and digital transducers, Measurement of temperature, pressure, displacement, acceleration, noise level, Instrumentation for strain, displacement, velocity, acceleration, force, torque and temperature.
III	SIGNAL CONDITIONING	Instrumentation amplifiers, isolation amplifiers, analog multipliers, analog dividers, function generators, timers, sample and hold, frequency to voltage converters, Shielding and grounding.
IV	POWER SYSTEM INSTRUMENTATION-I	Measurement of voltage, current, phase angle, frequency, active power and reactive power in power plants. Energy meters.
V	POWER SYSTEM INSTRUMENTATION-II	Capacitive voltage transformers and their transient behavior, Current Transformers for measurement and protection, composite errors and transient response.

EE605 GENERATION OF ELECTRIC POWER

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	CONVENTIONAL ENERGY GENERATION METHODS	<p>(i) Thermal Power plants: Basic schemes and working principle. (ii) Gas Power Plants: open cycle and closed cycle gas turbine plants, combined gas & steam plants – basic schemes. (iii) Hydro Power Plants: Classification of hydroelectric plants. Basic schemes of hydroelectric and pumped storage plants. (iv) Nuclear Power Plants: Nuclear fission and Nuclear fusion. Fissile and fertile materials. Basic plant schemes with boiling water reactor, heavy water reactor and fast breeder reactor. Efficiencies of various power plants.</p> <p>Impact of thermal, gas, hydro and nuclear power stations on environment. Green House Effect (Global Warming). Renewable and non-renewable energy sources. Conservation of natural resources and sustainable energy systems. Indian energy scene. Introduction to electric energy generation by wind, solar and tidal.</p>
III	LOADS AND LOAD CURVES	<p>Types of load, chronological load curve, load duration curve, energy load curve and mass curve. Maximum demand, demand factor, load factor, diversity factor, capacity factor and utilization. (ii) Power factor improvement: Causes and effects of low power factor and advantages of power factor improvement. Power factor improvement using shunt capacitors and synchronous condensers</p>
IV	POWER PLANT ECONOMICS	<p>(i) Capital cost of plants, annual fixed and operating costs of plants, generation cost and depreciation. Effect of load factor on unit energy cost. Role of load diversity in power system economics. (ii) Calculation of most economic power factor when (a) kW demand is constant and (b) kVA demand is constant. (iii) Energy cost reduction: off peak energy utilization, co-generation, and energy Conservation.</p>
V	TARIFFS	<p>Objectives of tariffs. General tariff form. Flat demand rate, straight meter rate, block meter rate. Two part tariff, power factor dependent tariffs, three-part tariff. Spot (time differentiated) pricing. (ii) Selection of Power Plants: Comparative study of thermal, hydro, nuclear and gas power plants. Base load and peak load plants. Size and types of generating units, types of reserve and size of plant. Selection and location of power plants.</p>

EE606 NON-CONVENTIONAL ENERGY SOURCES

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	INTRODUCTION	Energy sources & their classification, conventional and non conventional energy sources, energy scenario: - World, Asian & Indian energy scenario. Transmission and distribution losses, renewable sources: Need for renewable sources, renewable energy resources, renewable energy scene in India.
II	SOLAR ENERGY	Solar radiations, ways & harnessing solar energy, various generations of solar cell, solar photovoltaic technology photovoltaic, design trends, solar cell configurations, solar chimney, solar pond, solar energy programmer by MNES, Pole of nanotechnology to increase the efficiency of solar cells.
III	WIND ENERGY	Working of wind power arrangement, Basic components of wind energy conversion systems, potential of wind power in India, wind energy scenario in India, types of wind machines. Comparison between fossil fuels and wind, wind energy & photo voltaic, Application of wind energy, advantages and disadvantages.
IV	BIOMASS ENERGY	Introduction, Biomass project and support from the government, Biomass and the environment, Application of biomass, advantages and disadvantages.
V	OTHER NON-CONVENTIONAL ENERGY SOURCES	Geothermal energy, suitable places, geothermal power plants, Advantages and disadvantages, Tidal power plants & working, Advantages and disadvantages, mini & micro hydro electric plants, advantages & limitations, hydrogen as a wonder fuel, Nuclear fusion energy.

EE611 ADVANCED MICROPROCESSORS LAB

Teaching Hrs.
L-0, T-0, P-2
(30)}

Exam Hrs. : 3 Hrs.
Exam Marks: 75 {Internal (45) & University

CONTENTS OF SYLLABUS

List of Experiments:

S. No.

- 1 To add two 8 bit nos. & result may be (a) 8 bit (b) 16 bit.
- 2 To find largest of 2 Nos, 3 Nos & from array.
- 3 To find smallest of 2 Nos, 3 Nos & from array.
- 4 To transfer block of bytes from one set of memory location to another set of memory location (a) in some order (b) in resource order.
- 5 To perform multi byte addition.
- 6 To perform multi byte sublimation.
- 7 To perform multi byte decimal addition.
- 8 To generate to terms for febonic series.
- 9 To arrays given data array in ascending order.
- 10 To arrays given data array in descending order.

EE612 HIGH VOLTAGE LAB

Teaching Hrs.
L-0, T-0, P-2
(80)}

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University

CONTENTS OF SYLLABUS

List of Experiments:

S. No.

- 1 (i) Measurement of flashover voltage of 11 KV in type insulator and string type insulator (ii) Calculator of string efficiency of the string of suspension insulators (iii) Measurement of High Voltage using electrostatic voltmeter (iv) Improvement of string efficiency by connecting guard ring.
- 2 Find out the dielectric strength of the transformer oil.
- 3 Perform puncture voltage testing on (i) Healthy cable (ii) cable having pinhole in the insulation.
- 4 Study of zero sequence current in three phase transformers.
- 5 To find out the sequence component of synchronous machines.
- 6 To see the burden effect on the performance of CT and measure the phase angle and ratio error.
- 7 (i) Study of over current relay. (ii) to draw the current/time characteristics of an over current relay for TMS=1 & 0.5 and PSM=1.25 & 1.0.
- 8 (i) Study of percentage bias differential relay (ii) To plot the characteristics of a percentage bias differential relay for 30%, 40% and 20%.
- 9 Study of Gas actuated Buchholz relay.
- 10 Study of under frequency relay and checking it's setting experimentally.
- 11 Study of over flux relay and auxiliary relays.
- 12 Study of auxiliary relays.

EE613 POWER ELECTRONICS-II LAB

Teaching Hrs.
L-0, T-0, P-2
(40)}

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (60) & University

CONTENTS OF SYLLABUS

S. No.	List of Experiments:
1	Study the single-phase inverter.
2	Study ac regulator using triac, anti parallel thyristor and triac & diac.
3	Study single-phase PWM inverter.
4	Study buck, boost and buck-boost regulators.
5	Study the forced commutated circuits.
6	Determine the dv/dt limitation of given SCR.
7	Study and test the triggering circuit of three phase half controlled bridge converter.
8	Study and test three phase half controlled bridge converter.
9	Study and test the triggering circuit of three-phase fully controlled bridge converter.
10	Study and test three-phase fully controlled bridge converter.

EE614 MATLAB & Ps-Pice Lab

Teaching Hrs.
L-, T-, P-2

Exam. Hrs. : 2 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	MATLAB	Basics of MATLAB matrices and vectors, matrix and array operations, Saving and loading data, plotting simple graphs, scripts and functions, Script files, Function files, Global Variables, Loops, Branches, Control flow, Advanced data objects, Multi-dimensional matrices, Structures, Applications in linear algebra curve fitting and interpolation. Numerical integration, Ordinary differential equation. (All contents is to be covered with tutorial sheets)
II	SIMULINK	Idea about Simulink, problems based on simulink. (All contents is to be covered with tutorial sheets)
III	PS-PICE PROGRAMS	1. Calculate the resistance of a conductor, given its dimensions & resistivity or determine the change in conductor resistance when the temp changes. 2. D.C.-analyze resistor networks to determine all junction voltages, component voltages, and component currents. 3. Transient –analyze RC & RL circuits to produce tables of component voltage & current levels for a given set of time instants. 4. Convert Y-connected resistor networks to delta-connected circuits.

EE701 SWITCHGEAR & PROTECTION

Teaching Hrs.
L-3, T-1, P-0
(80)}

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University

CONTENTS OF SYLLABUS

Units	Topic	Details of Coverage
I	Introduction	Causes and consequences of dangerous currents Faults Basic operation and classification relay, Selectivity, discrimination, sensitivity, reliability, economic of relay, Primary and backup protection. Pickup value, reset value.
II	ELECTROMAGNETIC RELAYS	Construction, operation and characteristics Electromagnetic over current relay, directional relay and direction over current relay, direction earth fault relay.
III	DISTANCE PROTECTION OF TRANSMISSION LINES	Construction and characteristics of impedance relays, C.T. and P.T. connection for distance protection, Reactance and mho characteristics, Transmission line and feeder protection. Frame leakage and circulating current protection.
IV	PROTECTION OF SYNCHRONOUS GENERATORS & TRANSFORMERS	Faults in stator winding of alternators differential protection. Single and multiple ground faults on the rotor, protection against excitation failure and prime mover failure. Differential protection of generator transformer unit. Differential protection of 3-phase transformers, effect of magnetizing inrush currents and methods for minimizing the effects, Buchholz protection.
V	CIRCUIT BREAKERS	Classification of switchgear and fields of application and relative merits. Theories of current interruption, energy balance and recovery rate theories. Practical systems of arc quenching in oil circuit breakers. Recent trends in H.V. circuit breakers, use of sulphur Hexafluoride, Rating of circuit breakers. Testing of circuit breakers, current chopping, resistance switching.

EE702 UTILISATION OF ELECTRICAL POWER

Teaching Hrs.
L-3 T-1 P-0

Exam. Hrs. - 3 hrs
Marks Theory Exam.-80 Term Test – 20 Total – 100

		Contents of Syllabus
Units	Topic	Details of Coverage
I	Electric Heating & Welding	Heating: Different methods of electric heating. Principle of high frequency induction and di-electric heating. Construction, operation, performance and applications of arc furnace and induction furnace. Welding: Welding process, welding transformer, Classification of Electric Welding: arc welding, resistance welding, Welding of various metals.
II	Illuminations	Definitions, laws of illuminations, polar curves, luminous efficiency, photometer, incandescent lamps: filament materials, halogen lamp. electric discharge lamps: sodium vapour lamp mercury vapour lamp and fluorescent lamp. Light Calculations: commercial, industrial, street and flood lighting.
III	Electric Traction	Systems of electric traction, power supply systems for track electrification-Comparison and application of different systems. Traction Methods : Types of services, speed time and speed distance curves, average and schedule speed. Tractive effort, estimation of power and energy requirements: specific energy consumption, Mechanics of train movement. Coefficient of adhesion, Adhesive weight, effective weight
IV	Traction Motor Control	Systems of electric traction, power supply systems for track electrification-Comparison and application of different systems. Traction Methods : Types of services, speed time and speed distance curves, average and schedule speed. Tractive effort, estimation of power and energy requirements: specific energy consumption, Mechanics of train movement. Coefficient of adhesion, Adhesive weight, effective weight.
V	Means of Supplying Power and Train Lighting	Substation equipment and layout. Feeding and distribution systems. Overhead equipment, current collection. System of train lighting, special requirements, Methods of obtaining unidirectional polarity and constant output voltage.

EE703 POWER SYSTEM ENGINEERING

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (80) & University (20)}

CONTENTS OF SYLLABUS

Units	Topic	Details of Coverage
I	Economic Operation of Power Systems	Introduction, system constraints, optimal operation of power systems. Input output, heat rate and incremental rate curves of thermal generating units. Economic distribution of load between generating units within a plant. Economic distribution of load between power stations, transmission loss equation. Introduction to unit commitment and dynamic programming. Interconnected Power Systems: Introduction to isolated and interconnected powers systems. Reserve capacity of power stations, spinning and maintenance reserves. Advantages and problems of interconnected power systems. Power systems inter connection in India.
II	Voltage Control	Need of Voltage Control, Methods of voltage control, Tap Changing transformer, phase angle control and phase shifting transformer. Series compensation of transmission lines, location and protection of series capacitors, advantages and problems., (i) Introduction to voltage stability.
III	Power System Steady State Stability	Introduction to steady state and dynamic stabilities, steady state stability limit, Power angle equations and power angle curves under steady state and transient conditions. Rotor dynamics and swing equation (solution of swing equation not included), synchronizing power coefficient.
IV	Introduction to transient stability & its Analysis	Introduction to transient stability. Equal area criterion and its application to transient stability studies under basic disturbances, critical clearing angle and critical clearing time. Factors affecting stability and methods to improve stability.
V	Excitation Systems	Introduction of excitation systems of synchronous machines, types of excitation systems, Elements of various excitation systems and their control (functional block diagrams and their brief description)-DC excitation systems, AC excitation systems, brushless excitation system.

EE704 POWER SYSTEM ANALYSIS

Teaching Hrs.
L-3, T-1, P-0

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topic	Details of Coverage
I	Symmetrical Fault Analysis	Percent and per Unit Quantities. Single line diagram for a balanced 3-phase system. Transient in R-L Circuit. Symmetrical and asymmetrical short circuit currents in synchronous generator. Equivalent circuits of synchronous machine under sub transient, transient and steady state conditions. Analysis of three phase faults.
II	Symmetrical Components	Fortes cue theorem. Symmetrical component transformation Phase shift in star-delta transformer. Sequence impedances of synchronous machine, transformers and transmission lines. Zero sequence network of transformers and transmission lines Construction of sequence networks of a power system.
III	Unsymmetrical Fault Analysis	Signal line to ground, line-to-line and double line to ground faults. Connection of sequence networks under fault conditions. Analysis of unsymmetrical faults using symmetrical components.
IV	Load Flow Analysis –I	Formulation of load flow problem. Bus classification Static load low equations (SLFE). System variables solution of SLFE. Bus admittance matrix. Formation of Y-Bus by Singular Transformation.
V	Load Flow Analysis –II	Load flow problems. Gauss Seidel, Newton Raphson, Decoupled and fast decoupled methods for load flow analysis. Calculation of reactive power at voltage controlled buses in the Gausse-Seidel iterative method using Y-bus. Representation of transformers - Fixed tap setting transformer, Tap changing under load transformers, Phase shifting transformers, Tie line control. Comparison of methods of load flow analysis.

EE705 ARTIFICIAL INTELLIGENCE TECHNIQUES

Teaching Hrs.
L-3, T-0, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	Artificial Intelligence	Introduction to AI and knowledge based Expert systems: Introduction, Importance and Definition of AI, ES, ES building tools and shells.
II	Knowledge Representation	Concept of knowledge, Representation of knowledge using logics rules, frames. Procedural versus. Declarative knowledge, forward versus backward chaining. Control Strategies: -Concept of heuristic search, search techniques depth first search, Breath first search, Generate & test hill climbing, best first search.
III	Artificial Neural Network Perceptions	Biological Neurons and synapses, characteristics Artificial Neural Networks, types of activation functions. Perception representation, limitations of perceptrons. Single layer and multiplayer perceptrons. Perceptron learning algorithms.
IV	Basic Concepts in Learning ANN	Supervised learning, Back propagation algorithm, unsupervised learning, Kohonen's top field network & Algorithm.
V	Fuzzy Logic	Fuzzy logic concepts, Fuzzy relation and membership functions, Defuzzification, Fuzzy controllers Genetic algorithm: concepts, coding, reproduction, crossover, mutation, scaling and fitness.

EE706.1 POWER SYSTEM TRANSIENTS

Teaching Hrs.
L-3, T-0, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	Introduction to Transient	Wave terminology, Development of wave quotations, Terminal problems, Lattice diagrams, Origin and Nature of power system transients and surges, Surge parameters of plants, Equivalent Circuit representations. Lumped and distributed circuit transients
II	Line fault	Line energisation and de-energisation transients-Earth and earthwire effects. Current chopping in circuit breakers. Short line fault condition and its relation to circuit breaker duty. Trapped charge effects. Effect of source and source representation in short line fault studies
III	Control of transients	Control of transients, Lightning phenomenon, influence of tower footing resistance and earth resistance, Traveling waves in distributed parameters multiconductor lines, parameters as a function of frequency.
IV	Mechanism of Lightning Discharge & effect	Mechanism of Lightning Discharge Types of Lightning strokes, Harmful effects of lighting, protections against lightning, overhead Ground wires.
V	Lightening Arrester	Lightening Arresters, Types of lightening arresters, Surge Absorber simulation of surge diverters in transient analysis. Fourier integral and z transform methods in power system transient.

EE706.2 E-COMMERCE

Teaching Hrs.
L-3, T-0, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	INTRODUCTION	Motivation, Forces behind E-Commerce Industry Framework, Brief history of ECommerce, Inter Organizational E-Commerce Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, Architectural framework, Network Infrastructure for E-Commerce Network Infrastructure for ECommerce, Market forces behind I Way, Component of I way Access Equipment, Global Information Distribution
II	MOBILE COMMERCE	Introduction to Mobile Commerce, Mobile Computing Application, Wireless Application Protocols, WAP Technology, Mobile Information Devices, Web Security, Introduction to Web security, Firewalls & Transaction Security, Client Server Network, Emerging Client Server Security Threats, firewalls & Network Security.
III	ENCRYPTION	World Wide Web & Security, Encryption, Transaction security, Secret Key Encryption, Public Key Encryption, Virtual Private Network (VPM), Implementation Management Issues.
IV	ELECTRONIC PAYMENTS	Overview of Electronics payments, Digital Token based Electronics payment System, Smart Cards, Credit Card I Debit Card based EPS, Emerging financial Instruments, Home Banking, Online Banking.
V	NET COMMERCE	EDA, EDI Application in Business, Legal requirement in E - Commerce, Introduction to supply Chain Management, CRM, issues in Customer Relationship Management.

EE706.3 OPTIMISATION TECHNIQUES

Teaching Hrs.
L-3, T-1, P-0

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topic	Details of Coverage
I	INTRODUCTION	Introduction, classification of optimization problem classical optimization techniques: single variable and multivariable optimization with and without constraints, Lagranges and Kaun Tuckers method.
II	LINEAR PROGRAMMING PROBLEM	Definition of linear programming problem, graphical method, simplex method, two phase method, big-M method, pivotal method, duality, primal-dual problem, solution of dual from the final simplex table of primal.
III	PROJECT SCHEDULING	Project scheduling by PERT and CPM, network analysis, sequencing theory: general sequencing problem, n-jobs through 2 machines, 3 machines and n-machines, 2 jobs on machines.
IV	TRANSPORTATION PROBLEM	Definition, inihial feasible solution, north west corner rule, lowest cost entry method, vogels approximation method, optimality test, unbalanced transportation problem, degeneracy in transportation problem, the dual simplex.
V	NON LINEAR PROGRAMMING	Unimodal function, unrestricted search method with fixed and accelerated step size, exhaustive search method, Dichotomous search method, direct search methods, Hooke Jeeves method, Powells method.

EE711 COMPUTER BASED POWER SYSTEM AND PCB DESIGN LAB

Teaching Hrs.
L-0, T-0, P-2
(50)}

Exam Hrs. : 3 Hrs.
Exam Marks:125 {Internal (75) & University

CONTENTS OF SYLLABUS

List of Experiments:

S. No.

- 1 Methods of short term, medium term and long term load forecasting
- 2 Planning and designing of distribution system.
- 3 Planning and designing of transmission system
- 4 Sending end and receiving end power circle diagrams.
- 5 Real and reactive power control of generator using power circle diagram.
- 6 Use of electronics work bench for power system analysis.
- 7 Application of fuzzy logic for power system analysis
- 8 Study the design rules for PCBs in power electronics applications
- 9 Design a PCB for firing circuit of single-phase bridge converter using available computer software.
- 10 Based on designed PCB prepare the PCB.

EE712 INDUSTRIAL ECONOMICS & MANAGEMENT LAB

Teaching Hrs.
L-0, T-0, P-2

Exam Hrs. : 3 Hrs.
Exam Marks:125 {Internal (75) & University (50)}

CONTENTS OF SYLLABUS

S. No. List of Experiments:

- 1 **Money Banking and Trade:** Functions of money, supply & demand for money, money price level & inflation, black money, meaning, magnitude & consequences. Functions of Commercial banks, banking system in India, shortcomings and improvements.. Function of RBI, monetary policy-making, objectives and features. Sources of public revenue, principles of taxation, direct and indirect taxes, Theory of international trade, balance of trade and payment, Foreign exchange control, devaluation New economic policy: Liberalization, extending privatization, globalization.
- 2 **Management Principles:** Management functions, responsibilities of management to society, development of management thought. Nature of planning, decision making, management by objectives, Line and staff authority relationships, decentralization and delegation of authority, span of management,
- 3 **Production Management:** Production planning and control, inventory control, quality control and Total quality management. Tools of project management - CPM, PERT, project information systems. Marketing functions, management of sales and advertising marketing research.
- 4 **Human Resource Management:** Function, application of industrial psychology for selection, training and recruitment. Communication process, media channels and barriers to effective communication, theories of motivation, leadership.
- 5 **Finance and Account Management: Engineering Economics:** Investment decision, present worth, annual worth and rate of return methods. Payback time. Need for good cost accounting system, cost control techniques of financial control, financial statements, financial ratios, break-even analysis, budgeting and budgetary control.

EE801 EHV AC DC TRANSMISSION

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	EHV AC Transmission	Bulk power transmission over long distance & need for EHV transmission problems of EHV transmission. Power Handling capacity and surge impedance loading. Choice of economic voltage, standard transmission voltages. Bundled Conductors: Properties of bundled conductors, geometric mean radius of bundle, inductance and capacitance. Electrostatic fields of EHV lines. Effect of E.S. field on Humans, Animals and Plants. Corona effects: Corona loss, audio and radio noise.
II	Load Frequency Control	Introduction to control of active and reactive power flow. Turbine speed governing system. Speed governing characteristic of generating unit and parallel operation of generations. Element of load frequency control. Flat frequency, flat tie line and tie line load bias control. Automatic generation control (description of block diagram only)
III	Series and Shunt compensation	Effect of series capacitors and location of series capacitors. No load receiving end voltage and reactive power generation. Sub-synchronous resonance in series-capacitor compensated lines and counter measures. Shunt compensation - Variation of no load receiving end voltage. Static VAR Systems : TCR-FC, TCR, TSC-TCR and MSC-TCR Schemes.
IV	HVDC Transmission-I	Rectification: The 3-phase Bridge rectifier or Graetz circuit, Inversion. Kinds of D.C links, Paralleled and Series connection of thyristors, Converter control characteristics, firing angle control and extinction angle control. Parallel operation of D.C. link with A.C. transmission line. Power flow in HVDC transmission system.
V	HVDC Transmission-II	Converter Station: Major components of a converter station-converter unit, filters, reactive power source. Ground return and ground electrode. Advantages and disadvantages of HVDC transmission. Introduction to multiterminal HVDC systems. Comparison between AC and DC transmissions. Break even distance for overhead transmission lines and underground cables. Application of HVDC transmission.

EE802 ELECTRICAL MACHINE DESIGN

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	General	Factors and limitations in design. Output coefficients, classification of magnetic materials and allowable flux densities. Calculation of magnetic circuits, magnetizing current, coils for given temperatures. Real and apparent flux densities. Tapered teeth. Carter's coefficient, leakage fluxes reactances. Classifications of insulation materials and the temperature ranges.
II	Armature Winding	General features of armature windings, single layer, double layer and commutator windings, integral and fractional slot windings, winding factors. Harmonics, eddy current losses in conductors.
III	Heating Cooling and Ventilation	Heat dissipation, heat flow, heating cooling curves. Heating cooling cycles, estimation of maximum temperature rise, cooling media. Quantity of cooling media. Types of enclosures. Ratings, heat dissipation. Methods of ventilation.
IV	Design of Machines	Application of above design principles for the design of Power Transformers and Synchronous Machines.

EE803 ELECTRICAL DRIVES & CONTROLS

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	Dynamics of Electric Drives	Fundamental torque equations, speed-torque conventions and multi-quadrant operation, equivalent values of drive parameters, nature and classification of load torques, steady state stability, load equalization, close loop configurations of drives.
II	DC Drives	Speed torque curves, torque and power limitation in armature voltage and field control, Starting, Braking-Regenerative Braking, dynamic braking and plugging. Speed Control-Controlled Rectifier fed DC drives, Chopper Controlled DC drives.
III	Induction Motor Drives-I	Starting, Braking-Regenerative braking, plugging and dynamic braking. Speed Control-Stator voltage control, variable frequency control from voltage source, Voltage Source Inverter (VSI) Control.
IV	Induction Motor Drives-II	Variable frequency control from current source, Current Source Inverter (CSI) Control, Cycloconverter Control, Static rotor resistance control, Slip Power Recovery- Stator Scherbius drive, Static Kramer drive.
V	Synchronous Motor Drive	Control of Synchronous Motor-Separately Controlled and VSI fed Self-Controlled Synchronous Motor Drives. Dynamic and Regenerative Braking of Synchronous Motor with VSI. Control of Synchronous Motor Using Current Source Inverter(CSI)

EE804.1 PRINCIPLES OF NUCLEAR ENGINEERING

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	INTRODUCTION	Role and importance of nuclear energy; Nuclear cross-sections. Reaction rates; Nuclear fission and chain reaction; Criticality conditions; Conversion and breeding
II	REACTOR COMPONENTS	Reactor components and their characteristics, Classification and design features of research, Production, and thermal nuclear reactors, Introduction to fast and fusion reactor systems.
III	LAYOUT OF NUCLEAR POWER PLANTS I	Containment buildings; Primary containment vessels; Structure of reactor core; and mechanical stress in various structures. Description and analysis of power plant systems and components including steam generator, steam dryer and separator, pressurizer, reheater, heat exchanger, condenser, demineralizer, pumps ,turbine, generator, cooling tower; Auxiliary cooling systems.
IV	LAYOUT OF NUCLEAR POWER PLANTS II	Fuel handling mechanisms; Instrumentation Control and mechanisms; Radwaste systems; Electrical Systems; Reactor grid interface .
IV	BASIC CONSIDERATIONS IN NUCLEAR PLANT DESIGN	Components of nuclear power cost, Economic Comparison of nuclear and fossil fueled plants; Dual and multipurpose nuclear plants; Future trends in nuclear power cost.

EE804.2 NETWORK OPERATING SYSTEM

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	INTRODUCTION	Introduction to Operating Systems, Operating system services, multiprogramming, time-sharing system, storage structures, system calls, multiprocessor system. Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling I/O devices organization, I/O devices organization, I/O devices organization, I/O buffering
II	PROCESS SCHEDULING	Process concept, process scheduling, operations on processes, threads, inter-process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock problem, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling
III	CONCEPT OF MEMORY MANAGEMENT	Concepts of memory management, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, and paging combined with segmentation.
IV	CONCEPT OF VIRTUAL MEMORY	Concepts of virtual memory, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation. Security threads protection intruders-Viruses-trusted system
V	DISC SCHEDULING	Disk scheduling, file concepts, file access methods, allocation methods, directory systems, file protection, introduction to distributed systems and parallel processing case study

EE 804.3 STATIC PROTECTIVE RELAYS

Teaching Hrs.
L-3, T-1, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage
I	INTRODUCTION	Basic for static relay development, classification of static relays, microprocessor based relays, Digital protection, advantages of digital protection. Basic protection scheme using microcomputer.
II	STATIC RELAY COMPONENTS	Semi conductor devices, static switching, logic circuits and relay logic. Integrated circuits, transducers and interface devices, replica impedances, time delay devices, sequence filters, voltage regulators.
III	STATIC COMPARATORS	Single input multi-input comparators. Amplitude comparator-integrating, instantaneous and sampling techniques ;phase comparators-vector product & coincidence techniques. Direct phase comparison, phase splitting technique, integrating phase comparison. Duality of amplitude and phase comparison.
IV	STATIC RELAYS	Over current relays, directional over current relays using Hall crystal, rectifier bridge, instantaneous since comparator. Distance relay, impedance Reactance admittance, offset mho, trapezoidal and elliptical characteristics. Differential relays.
V	SCHEMES OF PROTECTION	Static switching scheme of distance relays. Polyphase distance relays. Static differential protection for generators, transformer and Bus zone. static protection for motors, single-phase preventer.

EE811 ADVANCED POWER ELECTRONICS LAB

Teaching Hrs.
L-0, T-0, P-2
(40)}

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (60) & University

CONTENTS OF SYLLABUS

List of Experiments:

S. No.

- 1 Study the modern power semiconductor devices and compare them.
- 2 Study the SCR regulated power supply.
- 3 Study the lamp flasher.
- 4 Study the SCR ring counter.
- 5 Study the SCR dc circuit breaker.
- 6 Study the zero volt switching.
- 7 Study the thyristor alarms.
- 8 Control the speed of dc motor using single-phase bridge converter.
- 9 Control the speed of dc motor using three-phase bridge converter.
- 10 Control the speed of dc motor using chopper.
- 11 Control the speed of ac motor using inverter.
- 12 Control the speed of ac motor using ac controller.

EE812 COMPUTER BASED ELECTRICAL MACHINE DESIGN LAB

Teaching Hrs.
L-0, T-0, P-2
(40)}

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (60) & University

CONTENTS OF SYLLABUS

S. No. List of Experiments:

- 1 GENERAL : Calculation of magnetic circuits-Determine of magnetizing current for transformer & 3- \tilde{A} Induction motors, Determine of mmf required for air gap of rotating electrical machines.
- 2 ARMATURE WINDINGS : Design of armature windings of AC rotating machines, Integral & fractional slot windings.
- 3 HEATING & COOLING : Estimation of maximum temperature rises in electrical machines during their operation.
- 4 Design of distribution & power transformer.
- 5 Design of synchronous alternators.
- 6 Design of 3-phase induction motor.

EE813 ELETRIC DRIVES & CONTROL LAB

Teaching Hrs.
L-0, T-0, P-2
(40)}

Exam Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (60) & University

CONTENTS OF SYLLABUS

List of Experiments:

S. No.

- 1 Study and test the firing circuit of three phase half controlled bridge converter.
- 2 Study and obtain waveforms of 3 phase half controlled bridge converter with R and RL loads.
- 3 Study and test the firing circuit of 3-phase full controlled bridge converter.
- 4 Study and obtain waveforms of 3-phase full controlled bridge converter with R and RL loads.
- 5 Study and test 3-phase AC voltage regulator.
- 6 Control speed of dc motor using 3-phase half controlled bridge converter. Plot armature voltage versus speed characteristic.
- 7 Control speed of dc motor using 3-phase full controlled bridge converter. Plot armature voltage versus speed characteristic.
- 8 Control speed of a 3-phase induction motor in variable stator voltage mode using 3-phase AC voltage regulator.
- 9 Control speed of universal motor using AC voltage regulator.
- 10 Study 3-phase dual converter.
- 11 Study speed control of dc motor using 3-phase dual converter.
- 12 Study three-phase cycloconverter and speed control of synchronous motor using cycloconverter.
- 13 Control of 3-Phase Induction Motor in variable frequency V/f constant mode using 3-phase inverter.