

SCHEME OF INSTRUCTION & EXAMINATION

B.E III YEAR (REGULAR)

(ELECTRICAL & ELECTRONICS ENGINEERING)

SEMESTER - I

Sl. No.	Syllabus Ref.No	SUBJECT	Scheme of Instructions		Scheme of Examination		
			Periods per Week	L/T D/P	Duration in Hrs	Maximum Marks	Sessi- onals
THEORY							
1.	EE 301	Power Systems-II	4/1	-	3	75	25
2.	EE 302	Electrical Machinery-II	4/1	-	3	75	25
3.	EE 303	Power Electronics	4	-	3	75	25
4.	EE 304	Digital Electronics & Logic Design	4	-	3	75	25
5.	EE 305	Linear Integrated Circuits	4	-	3	75	25
6.	EE 306	Linear Control Systems	4/1	-	3	75	25
PRACTICALS							
1.	EE 331	Electrical Machines Lab-1	-	3	3	50	25
2.	EE 332	Control Systems Lab	-	3	3	50	25
TOTAL			24/3	9	-	550	200

EE 301

POWER SYSTEMS –II

Instruction	4+1 Periods per Week
Duration of university Examination	3 Hours
University Examination	75 marks
Sessional	25 marks

UNIT-I

Transmission Line theory: Short, medium, long lines-Line calculations, Tuned Lines-power Circle Diagrams and their applications. Corona: Causes disruptive and Visual Critical voltages, Power loss-minimization of Corona effects

UNIT-II

Voltage Control: Phase Modifiers, Induction Regulators—tap changing Transformers, Series and Shunt Capacitance, Reactive Power Requirement Calculations. Static Var compensators-Thyristor Switched Capacitors.

UNIT-III

Per Unit System of Representation: Use of per unit quantities in power systems, Advantages of per unit system. Symmetrical Three Phase transients in R-L series circuits-Short Circuit Currents-Reactance's of Synchronous machines-Symmetrical Fault Calculations. Short circuit capacity of a bus.

UNIT-IV

Unsymmetrical Faults: Symmetrical components of unsymmetrical phasors- power in terms of symmetrical components-sequence impedance and sequence networks. Sequence networks of unloaded generators-Sequence impedances of circuit elements-single line to ground, line-to-line and double line to ground faults on unloaded generator-unsymmetrical faults of power systems.

UNIT-V

Transients in Power System: Cause of over voltages. Traveling Wave Theory-Wave equation-open Circuited Line-The short circuited line-junction of lines of different natural impedances-Reflection and refraction Coefficients-junction of cable and overheads lines-junction of three lines of different natural impedances-Bewley Lattice diagram.

Suggested Reading:

1. John J. Grainger William D.Stevenson jr.Power System Analysis,Tata mcGrawHill Edn.2003
2. C.L Wadhwa,Electrical Power Systems,Wiley EasternLtd.,2nd Edition.1995.
3. A.Chakrabarti , M.L Soni, P.V Gupta, U.S.Bhatnagar, A Text book on power System, Dhanpat Rai & Co(P)Ltd-1999
4. I J Nagrath & D.P.Kothari “Modern Power Systems Analysis” TMH Edition, 2003.

EE-302

ELECTRICAL MACHINERY-II

Instruction	4+1 Periods per Week
Duration of university Examination	3 Hours
University Examination	75 marks
Sessional	25 marks

UNIT-I

Parallel operations of Single phase Transformer and load sharing .Insulation of Windings and terminals. Cooling arrangements in Transformers. Testing of Transformers-Routine Tests and Special tests-Measurement of Voltage ratio and check of voltage-vector relationship. Measurement of No-load loss and current. Measurement of Insulation resistance .Installation and maintenance of Transformers.

UNIT-II

Poly-phase Transformer-Connections-Choice of Transformer Connections ,Third harmonic voltages—Phase Conversion-3phase to 2phase transformation-Scott connection. Constructional features of three phase transformers, tertiary winding, parallel operation of transformer, Auto Transformer- Comparison with two winding transformers-Conversions of two winding transformer into auto transformer. Tap Changers on transformers-No-load tap changer-on-load tap changer.

UNIT-III

Three-phase Induction Motor- Constructional features- Rotating Magnetic field theory- Principle of operation of squirrel cage and slip ring motors—Vector Diagram-Equivalent circuit-Expression for torque-Starting torque, Maximum torque- Slip/Torque characteristics-Performance characteristics-Equivalent circuits from tests—Current loci circle diagram-Predetermination of characteristics of Induction motors.

UNIT-IV

Starting methods of Induction motors. Modes of operations, torque and power limits of Induction motors-Speed control methods- Resistance Control, Voltage Control. pole changing,Cascading,variable frequency control-slip power recovery schemes-Kramer drive.Scherbius drive-Double cage Induction motors. Induction regulator.

UNIT-V

Two phase servo motor characteristics-Single phase motors-Theory and operation of Single phase motors – Shaded pole, Split phase and capacitor motors—Compensated and uncompensated series and Repulsion motors. Linear Induction motors.

Suggested Reading:

1. M.G.Say, The performance and Design of A.C Machines-pitman,1985.
2. I J Nagrath & D.P.Kothari, Electrical machines, Second Edition Tata Mc Graw Hill,1997 .
3. P.S Bimbhra ,Generalised theory of Electrical Machines, Khanna Publications Fifth Edition 1995.
4. J.b Gupta, Theory and performance of Electrical Machines , S.K Kararia & Sons,2003

Instruction	4 Periods per Week
Duration of university Examination	3 Hours
University Examination	75 marks
Sessional	25 marks

UNIT-I

Power Semiconductor diodes and Transistors: Types of power diodes-General purpose diodes-Fast recovery diodes- Schottky Diodes- Their characteristics and applications Bipolar junction transistors-power MOSFETS P-Channel, N-Channel-IGBTs- Basic Structure and working, Steady state and switching characteristics-Comparison of BJT,MOSFET and IGBT-Their applications.SCRs-Static and dynamic characteristics-Two transistor analogy.

UNIT-II

Turn on and turn off mechanism of BJT.Power MOSFET,IGBTs.SCR trigger circuits-R,RC and UJT triggering circuits. Triggering circuits for single phase bridge rectifier and Choppers. The various communication methods of SCRs. Cooling and mounting techniques and protection of SCRs.

UNIT-III

Principles of controlled rectification—Study of single phase and three phase half controlled and full controlled bridge rectifiers with R,RL,RLE loads Effect of source inductances. Dual converters—circulating current mode and circulating current free mode-control strategies

UNIT-IV

Principle of operation and Control strategies of Choppers-Classification of Choppers A.B.C.D.E --Step-up-chopper—Morgan chopper-Jones chopper. Switching mode regulators-Study of Buck, Boost and Buck-Boost regulators. Principle of operation of Single Phase Bridge type Cycloconverters and their applications.

UNIT-V

Principle of operation of single phase Inverters-Three phase bridge inverters (180° and 120° modes)-voltage control of invertors—Single pulse width modulation-multiple pulse width modulation-sinusoidal pulse width modulation .Comparison of Voltage Source Inverter and Current Source Inverters. Single phase AC voltage Controllers.

Suggested Reading:

1. Bimra, P.S, Power Electronics, 3rd Edition, Khanna Publishers, 1994
2. Rashid, M.H, Power Electronics Circuits, Devices and Applications, Prentice Hall of India, 1994
3. Singh, M.D., Khanchandani. K.B.- Power Electronics, Tata McGraw Hill
4. M.S. Jamil Asghar, Power Electronics, Prentice Hall of India, 2004

EE-304

DIGITAL ELECTRONICS AND LOGIC DESIGN

Instruction	4 Periods per Week
Duration of university Examination	3 Hours
University Examination	75 marks

Sessional

25 marks

UNIT-I

Boolean Algebra and combinational logic—AND,OR and NOT operations-Laws of Boolean Algebra-minimization of Boolean expressions-Truth tables and maps sum of products and product of sums-map method of reduction-incompletely specified functions multiple output minimization.

UNIT-II

Tabular minimization-Digital logic families and IC's-Characteristics of Digital IC's , Introduction to RTL,DTL,TTL,CMOS,ECL families, Details of TTL logic family 0totem pole, open collector outputs. Wired AND operation, comparison of performance, TTL subfamilies, multiplexer and de-multiplexer, encoder and decoder, code converters, implementation of combinational logic using standard logic gates and multiplexers.

UNIT-III

Binary arithmetic and circuits-Half and Full adder— Subtractor and Magnitude comparator ,number complements—two's complement arithmetic, carry look ahead adder, decimal numbers and their codes, BCD and Excess-3 arithmetic.

UNIT-IV

Synchronous Sequential Circuits-Basic latch circuit- debouncing switch-SR,JK,D and T flip-flops-truth table and excitation table-ripple and synchronous counters up/down counter-general BCD counter-shift registers, ring counters.

UNIT-V

Design of Digital Systems-Concept of state. State diagram-design of counters Sequence detector and generators-Design procedure, synthesis using D,JK,T flip-flops-applications of registers-concepts of programmable, logic- PROM, PLA, PAL

Suggested Reading:

1. Tocci & Windmer-Digital Systems-Prentice Hall of India-Eighth Edition, 2003.
2. Morris Mano M.-Digital Design, Prentice Hall of India, Third Edition, 2002.
3. Malvino and Leach, Digital Electronics, McGrawHill, 2003.
4. B.SomnadhNair, Digital Electronics and Logic Design, PHI, 2002.

EE-305

LINEAR INTEGRATED CIRCUITS

Instruction	4 Periods per Week
Duration of university Examination	3 Hours
University Examination	75 marks
Sessional	25 marks

UNIT-I

Operational amplifiers - Characteristics, open loop voltage gain, output impedance, input impedance, common mode rejection ratio-offset balancing techniques-Slew rate, Frequency response-basic applications- inverter summer, analog integrator differentiator, current to voltage converter, voltage to current converter, voltage follower, a-c amplifier.

UNIT-II

Voltage limiter, clipper and clamper , precision rectifier-full wave and half wave peak detector, comparator, zero crossing detector, Schmitt trigger, monostable, astable , bistable multiplier, divider, difference amplifier instrumentation amplifier circuits using Op-amps.

UNIT-III

Waveform generation using Op-amps-Sine, Square, Triangular and Quadrature oscillators, voltage controlled oscillator/ multivibrator ,voltage to frequency converter,555 timer functional diagram, operation as monostable and astable.

UNIT-IV

Series voltage regulator using Op-amp-shunt regulators using Op-amp-switching regulators using Op-amp-dual voltage regulator-fixed voltage regulators-dual tracking regulators-hybrid regulators-current sensing and current feed back protection

UNIT-V

RC active filters-low pass-high-band pass-band reject-notch-first order-second order-transformation-state variable filter-switched capacitor filter-universal filter. Balanced modulator/demodulator

Suggested Reading:

1. Gayakad R.A. Op-Amps and Linear Integrated Circuits, 4th Edition, Prentice Hall of India, 2002
2. Malvino Albet Paul, Electronic Principles, 6th Edition, Tata McGraw Hill, 1999.
3. Coughilin and Driscoll, Operational Amplifiers and Linear Integrated Circuits, 6th Edition, Prentice Hall of India, 2003
4. David A. Bell, Operational Amplifiers and Linear IC's, PHI, 2003.

EE-306

LINEAR CONTROL SYSTEMS

Instruction		4 + 1 Periods per Week
Duration of university Examination		3 Hours
University Examination	75 marks	
Sessional	25 marks	

Unit – I

Open and closed loop Systems- Continuous time and discrete time control systems. Control system components- Error sensing devices-Potentiometers. Syncros, AC-DC servo motors- Block diagram representation, Transfer function and impulse response-Signal flow graphs.

Unit –II

Time Response: Types of Input, Transient response of second order system for step input. Time diagram specifications-Types of system-static error coefficients, Error series-Routh-Hurwitz criterion of stability

Root Locus Technique-Typical systems analyzed by root locus technique-Effect of location of roots on system response PID controller.

Unit – III

Frequency Response Plots: Bode plots, Frequency domain specifications MP, wP for a second order system, Nyquist criterion for a stability, relative stability gain and phase margin, Compensation: Cascade compensation using Bode Plots.

Unit – IV

State Space Representation: Concept; of State, state variable, state models of linear time invariant systems. Derivation of state models from transfer functions and differential equations. State Transition matrix-Solution of State equations by time domain method. Observability and Controllability.

Unit – V

Discrete Control Analysis: The Z-transformation, digital control, advantages and disadvantages. Digital control system architecture. The discrete transfer function. Sample data system. Transfer function of sample data systems-Z- plane specifications of control system design. Z-domain stability.

Suggesting Reading:

1. I.J. Nagarath, M. Gopal, Control System Engineering, New Age International(P) Limited Publishers, 1999.
2. J.F Franklin and J.D Powell-Digital Control of Dynamic Systems, Addison Wesley, 1980
3. M. Gopal, Control Systems Principles and Design-Tata McGraw Hill, 2nd Edition, 2003
4. K. Ogata, Modern Control Systems, 3rd Edition, PHI, 2000

EE-331

ELECTRICAL MACHINES LAB - I

Instruction	3 Periods per Week
Duration of university Examination	3 Hours
University Examination	50 marks
Sessional	25 marks

List of Experiments:

1. To determine the magnetization characteristics and the speed Vs voltage curve of a separately and self excited D.C generator

2. To determine the load characteristics of separately excited and shunt generators
3. To determine the load characteristics of compound generator
4. To determine the performance characteristics of series motor
5. To determine the performance characteristics of D.C shunt motor
6. To determine the performance characteristics of Compound motor
7. Separation of iron and friction losses and estimation of parameters in D.C machines
8. (a) Speed Control of D.C shunt motor by shunt field control and armature resistance control (b) Swinburn's Tests
9. Separation of core losses in a Single Phase transformer
10. Open circuit and short circuit tests on a Single Phase transformer
11. Sumpner's test on two identical transformers.
12. Estimation of efficiency of DC Machine by Hopkinson test.

Note: Atleast 10 Experiments should be conducted in the semester

EE-332

CONTROL SYSTEMS LAB

Instruction	3 Periods per Week
Duration of university Examination	3 Hours
University Examination	50 marks
Sessional	25 marks

List of Experiments:

1. Characteristics of D.C and A.C Servo Motors
2. Characteristics of Synchro Pair and Stepper Motor
3. Frequency response of compensating networks
4. Step response of second order system
5. D.C position Control System
6. A.C position Control System
7. Closed loop PPI and PID controller
8. Step response and frequency response of a given plant

9. Design of lag and lead compensation for the given plant

10. ON/OFF Temperature Control Systems

11. Temperature control system

12. Level Control System

Note: Atleast 10 Experiments should be conducted in the semester