



SHIVAJI UNIVERSITY, KOLHAPUR

REVISED SYLLABUS FOR B.E. (ELECTRICAL ENGINEERING)

T.E. (ELECTRICAL ENGINEERING) PART-I

Sr. No.	Subjects	Teaching Scheme			Exam Scheme				
		L	P	Drg/Tut	TP	TW	POE	/OE	TOT
1	Electromagnetics	4	--	1	100	25	--	--	125
2	Electronic Circuit Theory	4	2	--	100	25	50	--	175
3	Power Systems	4	2	2	100	25	--	50	175
4	Instrumentation Techniques	4	2	--	100	25	25	--	150
5	Industrial Organisation & Management	4	--	1	100	25	--	--	125
	Total	20	6	4	500	125	75	50	750

T.E. (ELECTRICAL ENGINEERING) PART-II

Sr. No.	Subjects	Teaching Schemes			Exam Schemes			
		L	P	Drg/Tut	TP	TW	POE	TOT
1	Microprocessor and Applications	4	2	--	100	25	50	175
2	Power System analysis and Control	4	2	--	100	25	--	125
3	Linear Control Systems	4	2	--	100	25	25	150
4	Communication Systems	4	2	--	100	25	--	125
5	Power Electronics	4	2	--	100	25	50	175
	Total	20	10	--	500	125	125	750

TW - Term Work marks should be give based on class test, attendance and understanding of subject.



Shivaji University, Kolhapur

T.E. (Electrical) Engineering Part-I

1. Electromagnetics

Teaching Scheme :

Lectures : 4 Hours /Week

Tutorial : 1 Hours /Week

Examination Scheme:

Paper : 100 Marks

T.W. : 25 Marks

1. Electrostatic Field in Free Space:

Colomb's Law , Electric Force & concept of Electric Field , Electric potential , Gauss Theorem and application

2. Conductor and Insulators in Electric field:

Relation between Electrostatic potential and charges on conducting bodies, generalized form of Gauss's theorem, calculation of capacitance , Boundary conditions in Electrostatics

3 Method of solving Electrostatic field problems:

Direct solving of laplace Equations (Boundary and surface conditions, co-ordinate systems, separation of variables, in rectangular, cylindrical, spherical, co-ordinate system) Green's function, conformal transformation and complex variables, method of images, graphical method of solving electrostatic problems.

4. Steady magnetic field:

Biot Savart law , Ampere's law, Stroke's theorem, magnetic flux density and vector magnetic potential, current carrying conductor in magnetic fields, torque on a loop, Energy stored in magnetic field , Maxwell's Equations, and boundary condition.

5. Electromagnetic waves:

Wave propagation in dielectric & conducting media also in loss less non conductors, Law of refraction & Snell's law of refraction, Reflection of Electromagnetic wave for normal incidence , perpendicular, polarization , parallel polarization, standing waves, power and pointing vectors,

6. Transmission lines

Transmission line equations, transmission line parameters, sinusoidal steady state excitation, Smith's chart, impedance matching, impedance measurement, single and double stub matching transients in lossless lines,

Note:- Give at least 3 problems related to power transmission, Eddy current effect, SIL, traveling and standing waves propagation, at the joint of O.H. transmission line and cable

Books:-

1. Electromagnetic Engg. by William H. Hayt, Jr John A Buck, 6th Edition
Mc Graw Hill
2. Electromagnetic Theory and applications by Ashutosh Pramanik PHI Ltd.

Reference Books

1. Electromagnetics by Joseph A. Edminster. Tata Mc Graw Hill
2. Electromagnetics. by John d. Kraus, Tata Mc Graw Hill
3. Electromagnetic Field and Radiation system. By Jorden and Balmen

★★★★★ B+

T.E. (Electrical) Engineering Part-I

2. Electronic Circuit Theory

Teaching Scheme :

Lectures : 4 Hours /Week

Practical : 2 Hours/Week

Examination Scheme:

Paper : 100 Marks

T.W. : 25 Marks

POE : 50 Marks

Note:- The students have studied signals and systems, circuit theory, linear and digital integrated circuits, as well as software packages. With this background the students can assimilate the material readily and in depth.. The 'Practical Application' section given in most of the chapters of the text should be dealt with judiciously to create interest and to enable the students to handle the project in the final year. Term work and some of the experiments can be based on software packages

1. Semiconductor Diodes

Semiconductor materials, semiconductor diode, resistance levels, equivalent circuit, specification sheets, transition and diffusion capacitance, reverse recovery time, diode testing, Zener diodes, light emitting diodes, computer analysis.

2. Diode Applications

Load line analysis , diode approximations ,series diode configurations with d.c. inputs , parallel and series -parallel configurations, sinusoidal inputs-half wave and full wave rectification , clipper and clamper circuits. Zener diodes, computer analysis.

3. Bipolar Junction Transistors

Operation , common base – emitter and -collector configuration , limits of Operation and specification sheet, transistor testing ,casing and terminal identification
computer analysis

4. Bipolar Junction Transistor Biasing

Operating point, fixed –bias circuit , emitter – stabilized bias circuit , voltage – divider bias , miscellaneous bias configuration, design operations , transistor switching networks , troubleshooting techniques, bias stabilization , computer analysis.

5. Field Effect Transistors - Configurations

Construction and characteristics of JFETs , transfer characteristics , specification sheets depletion- type MOSFET, enhancement -type MOSFET, VMOS ,CMOS , computer analysis.

6. Field Effect Transistor Biasing

Fixed bias configuration, self bias configuration , voltage divider biasing depletion type MOSFETs , enhancement type MOSFETs ,design , troubleshooting ,computer analysis.

7. BJT Modeling

Two port system , the r_e transistor model , the hybrid equivalent model , graphical determination of the h parameters, variations of transistor parameters.

8. BJT Small -Signal Analysis

Common -emitter fixed -bias configuration , voltage -divider bias, various configurations, approximate and complete hybrid equivalent model , troubleshooting , computer analysis.

9. FET small Signal analysis

FET small signal model various JFET configurations , designing FET amplifier networks , computer analysis

10 Effects of Source and Load Impedance

Effect of a load impedance , effect of the source impedance, combined effect of source and load impedance , BJT and FET networks, cascaded systems, computer analysis.

11 BJT & JFET Frequency Response

Bodel plots, low frequency response of BJT and FET amplifier miller effect capacitance high frequency response of BJT and FET amplifier multistage frequency effects square wave testing computer analysis.

12 Compound Configurations

Cascade connection , cascode connection, ,Darlington connection, feedback pair, current source circuits, current mirror circuit, computer analysis.

13 Power Amplifiers

Amplifier types, class A amplifier, class B amplifier operation and circuits, distortion , heat sinking , class C and D amplifier , computer analysis.

14. Feedback Circuits

Feedback connection types , practical feedback circuits, stability and oscillator operation , computer analysis.

15. Power Supplies and Voltage Regulators

Filter considerations, capacitor and RC filtes , discrete transistor voltage regulation , IC voltage regulators, computer analysis

Text Books

R.L. Boyles Lad , Nashelsky Electronic Devices and Circuit Theory 8 th Eddition , Pearsons Education , Inc. Low price Edition 2002.

★★★★★ B+

T.E. (Electrical) Engineering Part-I**3. Power Systems**

Teaching Scheme :

Lectures : 4 Hours /Week

Practical : 2 Hours/Week

Drg/Tut : 2 Hours/Week

Examination Scheme:

Paper : 100 Marks

T.W. : 25 Marks

OE : 50 Marks

1. Power Transmission System:

Basic structure of power system consisting of generation , transmission , Tie line distribution and utilization.. Voltage levels for transmission , sub transmission and distribution.

2. Over head transmission lines :

Resistance :- Resistance of transmission lines Effect of temp. , skin effect and proximity effect.

Inductance:-

Flux linkages GMD and GMR Inductance of single phase and three phase lines with symmetrical and unsymmetric spacing transposition of lines . Double circuit 3 phase lines

Capacitance :-

Capacitance of single phase and three phase lines double circuit 3 phase lines . Bundled conductors.

Sag and tension in case of supports at unequal levels effect of wind pressure and ice covering on conductor sag . Introduction of transmission line poles. Importance of ROW (Right of Way)

Insulators:-

Pin type , suspension type , strain type and shackle type insulators. Potential distribution over suspension insulators string . String efficiency methods of improving string efficiency. Testing of insulators

Corona:-

Theory of corona formation , factors affecting corona , critical disruptive voltages , visual critical voltages and power loss due to corona. And methods of reducing corona effect.

3. Underground Cable Transmission:-

Requirements of underground cables and cable insulating materials ,cable construction , Insulation resistance , capacitance and dielectric stress in single core cable. Grading of cables Capacitance grading innersheath grading capacitance of 3 core cable.

Classification of Cables:-

Belted cables, Screened cables and pressure cable . Methods of laying underground cables and over head lines.

4. Performance of transmission lines :-

Representation of power system Single line diagram and impedance or reactance diagram . Per unit methods of representation of system and its components such as transformers (1 phase/3 phase) Two winding / Three winding) Synchronous machines (motors and generators) load

Performance of transmission lines :- Classification lines such as short,medium,long lines .Voltages and currents at sending end and receiving end of the lines . Determination of generalized ABCD constants in them

Circle Diagram:

Sending end and receiving power circle diagrams, universal power circle diagram.

Power factor improvement:-

Causes and disadvantages of low power factor by equipments such as static capacitors , synchronous condensers , phase advancers, calculation of p.f. correction

Voltage Control :-

Importance of voltage control and equipment used such as automatic voltage regulators , Tap changing transformers , Booster transformers Induction regulators synchronous phase modifiers.

5. Distribution:- Classification of Distribution systems

1. AC/DC systems
2. Primary/Secondary systems
3. Overhead /Underground systems
4. Connection scheme of distribution system : Radial system
Ring main system Interconnected systems, functions of feeders and distributors.

A.C. Distribution :- Calculation of currents fed and voltage drops far distributions with concentrated A.C. loading and fed at one end and Ring mains.

6. Sub stations:-

Sub station types and their location major equipment in sub station and its function . Bus bar arrangement . Single bus bar system . Duplicate bus bar systems Distribution Sub-station and high voltage substations.

Term Work :-

1. Minimum of 5 sheets based on above theory
2. Ten exercises on software based analysis

Note:- The computational burden is to be carried by computer preferably using mathematical software like MAT lab , Scilab , Maple, Mathematica , Mathcad

Test Books:-

1. Modern Power systems Analysis :- J.J. Nagrath & D.P. Kothari
2. Elements of power systems analysis :- Husain (3rd /4th /5th Edition)
3. A course in electrical Power M.L. Soni & Gupta& Bhatnagar
4. Electrical Power Generation Transmission & Distribution by Singh
5. Power system Analysis Hadi Sadat
6. Electrical Power J.B. Gupta.

★★★★★ B+

T.E. (Electrical) Engineering Part-I

4. Instrumentation Techniques

Teaching Scheme :
Lectures : 4 Hours /Week
Practical : 2 Hours/Week

Examination Scheme:
Paper : 100 Marks
T.W. : 25 Marks
POE : 25 Marks

1. Introduction

Instrumentation system configuration Brief idea of static characteristics of measuring devices Accuracy , precision errors, uncertainties. Linearity, resolution

2. Transducers

Definition , various types of transducers, variable parameter transducers, selection factors & typical applications of transducers

3. Signal Conditioning Generation

Chopper stabilized amplifier , Instrumentation amplifier, isolation & programmable gain amplifier , grounding and shielding ,active filters , specification, frequency response of 1 st order 2 nd order filter, practical comparators,modulators demodulators filter , sine & other waveform generation analyzer , sample and hold circuit, frequency to voltage & voltage to frequency converter.

4 Programmable Logic Controller

Introduction to PLC hardware , CPU memory i/p and o/p units, explanation of ladder diagram logic , instrumentation set & types of PLC system

PLC communication & networking , PLC selection & Installation

5. Digital Instruments

D/A & A/D converters , Data acquisition system, multiplexing , universal counter , frequency and time measurement Digital voltmeters, Q meter

6. Data Transmission & encoding methods

Telemetry : General telemetering system, modulation , freq telemetering (system Analog pulse telemetering)

7. Input- O/P Devices & Displays

Analog display , oscillograph , strip chart X-Y recorders , Tape recorders, storage oscilloscope , Digital I/P & O/p Devices process instrumentation

8. Applications :

Instrumentation set up for measurement of displacement , velocity & acceleration , strain, pressure & temperature, vibration , flow angular velocity & torque

Textbooks :

1. Electrical & Electronics Measurement - A.K. Sawhney
2. Instrumentation Devices & Systems - Rangan , Mani, Sharma
3. Process Control Instrumentation Technology - Johnson
4. Electronic Instrumentation & Measurement techniques - Welfrick Cooper
5. Industrial Instrumentation & Control - S.K. Singh

★★★★★ B+

T.E. (Electrical) Engineering Part-I
5. Industrial Organisation & Management

Teaching Scheme :
Lectures : 4 Hours /Week
Drg/Tut : 1 Hours/Week

Examination Scheme:
Paper : 100 Marks
T.W. : 25 Marks

1. Management functions: Definition of Management

a). Planning : Nature , type of planning , its importance and contribution to achievement of objective , forecasting methods and importance.

b) Organisation process : Importance and principles of organizing

c) Staffing : Importance , procedure of staffing performance appraisal methods.

d) Directing : Leadership style , theories of motivation , communication – its importance , barriers to communication and its remedies.

e) Controlling : Basic process , budgetary control

2 Financial Management : Financial functions of management meaning and importance, objectives of financial planning , estimating capital requirements, methods of financing , financial institutes in India.

3. Marketing : Distinction between marketing concept and selling concept , marketing research procedure, marketing mix of product , price place and promotion , advertising needs , types and advantages.

4. Production : Selection of site , plant layout objectives principles, types merits and demerits of different types of layout functions of P.P.C. , PERT/CPM, maintenance management

5. Cost Accounting : Elements of cost ,. Allocation of overheads, cost control , cost analysis.

6. Materials management : Inventory control , purchase it's importance policies and procedure , measurement of purchasing efficiency

7. Wage Administration : Definition of salary wage , different types of wage schemes , Advantages and disadvantages of schemes. Incentives- types of incentives, its merits and demerits, different types of incentive schemes.

8. Enterprenuership : meaning , importance of process of enterperenuership

9. Small scale industry : Definition , scope and importance in India , special incentives offered by state and central governments, proceduure to start SSI, Feasibility report writing.

10. Important provisions and rules of

1. Indian factories Act
2. Indian Electricity Act

11. Industrial Safety : Reasons for accident prevention management responsibility , tapes for preventing accidents , measuring safety.

Books Recommended

1. Management for Business and Industry – Clande S. George
2. Industrial Organisation - Bethel Atwater, Smity, Stackman & Riggs
3. Essentials Management – Kootz odonell
4. Management – Stoner
5. Industrial Organisation and Management – O.P. Khanna

★★★★★ B+



Shivaji University, Kolhapur
T.E. (Electrical) Engineering Part-II

1. MICROPROCESSOR AND ITS APPLICATIONS

Teaching Scheme :

Lectures : 4 Hours /Week

Practical : 2 Hours/Week

Examination Scheme:

Paper : 100 Marks

T.W. : 25 Marks

POE : 50 Marks

1. Architecture of Intel 8085 microprocessor, ALU, Instruction register-decoder, Timing and control unit, general purpose registers, Data and Address bus, Instruction set of 8085, data-transfer, arithmetic, logical, branching, stack, I/O and machine control instructions. 8 hrs
2. Addressing modes – Direct, Register, Indirect, Immediate addressing modes. 2hrs
3. Assembly language programming, subroutines, use of delay routine and display routine, stack operations, interrupts of 8085 and ISR. 6hrs
4. Instruction cycle, machine cycle, fetch cycle, execute cycle, timing diagrams. 4hrs
5. RAM, ROM and EPROM memory chips, memory organization and addressing techniques, EPROM programming and erasing. 3hrs
6. Peripheral chips – 8255, 8253, 8279 14hrs
Schematic block diagrams, operating modes and interfacing techniques, assembly language programs for interfacing these chips with 8085 (Detailed study expected).
7. Interfacing ADC 0808/08089 with 8085 for data acquisition, interfacing DAC 0800 with 8085. 2hrs
8. Peripheral chips – 8251 USART, 8257 And 8259 3hrs
Schematic block diagram, features and general operation of the chips in brief (Detailed study not necessary).
9. Applications of 8085 – 6hrs
 - a) Measurement of Voltage, current, frequency and power factor.
 - b) Stepper motor control.
 - c) Keyboard and 7 segment display interfacing

PRACTICALS:

At least 4, medium to high skill level experiments, on variety of assembly language programming (using delay routine, display routine and interrupt service routines).

At least 5, medium to high skill level experiments, on interfacing of 8255, 8253, 8279, ADC and DAC chips.

RECOMMENDED BOOKS:

1. Microprocessor Architecture Programming and Applications – R.S. Gaonkar
2. 0000 to 8085 Introduction to Microprocessors for Engineers and Scientists- P.K. Ghosh and P.R. Sridhar
3. Fundamentals of Microprocessors and Microcomputers – B.Ram

★★★★★ B+

T.E. (Electrical) Engineering Part-II
2. Power System Analysis and Control

Teaching Scheme :
 Lectures : 4 Hours /Week
 Practical : 2 Hours/Week

Examination Scheme:
 Paper : 100 Marks
 T.W. : 25 Marks

1. Network Equations:- Loop Equations and Node Equations, Bus admittance and bus impedance matrix, network solution using matrix algebra.

2. Symmetrical Components:- Symmetrical Components of Unsymmetrical phasors, power in terms of symmetrical components sequence impedances and sequence network of unloaded alternators and other power systems components network

3. Symmetrical and Unsymmetrical fault analysis :- Analysis and evaluation of symmetrical fault on unloaded alternator and the power system. Analysis and evaluation of the following Unsymmetrical faults on unloaded alternator and three phase power system with

- a) line to ground
- b) line to line
- c) double line to ground
- d) one conductor open fault
- e) Two conductor open fault

simplified models of synchronous machines for transient analysis Park's transformation and determination of transients constants with numerical problems.

4. Load flow studies :- Load flow problem Bus classification , Nodal admittance matrix , Network model formulation and development of load flow equations.

Iterative methods of solution

a) Gauss Sidel method

b) Newton Raphson method

c) Fast decoupled method

5. Economic operation of power systems :- Economic distribution of load between generating units within a plant , Economic distribution of load between plants , penalty factor, loss coefficients

6. Power Generation and Voltage Control :- Automatic generation and voltage control load frequency control problem, control area concept, modeling of speed governing system turbine (non reheat type)

Generator load model block schematic representation of single area power system for LFC . Steady state analysis and dynamic response of single area LFC model . Model of 2 interconnected control area suitable for LFC studies.

Automatic voltage control problem , Block schematic of alternator voltage regulator scheme. The function of important and the transfer function of each component in AVR scheme.

7 Power System stability :-

Power system stability problem dynamic of synchronous machine . Swing equation power angle equation.

Steady state stability and transient state stability Equal area criterion of stability and it's Application

Numerical solution of swing curve factors affecting transient stability , methods for improving stability of system

Load Frequency control :-

Objectives , tie line bias control , flat frequency control , supplementary control , Interconnected areas two area three area systems, state variable model for single two , three area cross coupling between control loops (AVR AGC) Applications of modern control theory . Application of artificial intelligence AGC using kalman methods

Reference

1. Elements of Power System Analysis by Stevenson
- 2 Power System Analysis by S.J. Nagrath and D.B. Kothari
- 3 Elementary Power System by Asfaq Husain

4. Power System Analysis by Hadi Sadat Copy 1999 Tata Mc Graw Hill Edition 2002
- 5 Power System and Elect. m/cs by M.K. Sarma and Groover

★★★★★ B+

T.E. (Electrical) Engineering Part-II

3. Linear Control systems

Teaching Scheme :
Lectures : 4 Hours /Week

Examination Scheme:
Paper : 100 Marks
T.W. : 25 Marks
POE : 25 Marks

The aim of this subject is to teach the practical application of Control to analysis and design of feedback systems. The subject builds on the foundation laid in earlier years especially signals and systems, familiarization with packages at S.E. Part-I and Linear Algebra, Advanced packages at S.E. Part-II. The subject places heavy emphasis on design.

Computer Aided analysis and design are emphasized , control system problems many times involve trial and error type of solution and can be lengthy and tedious . To solve these problems students should be given access to computers with appropriate software like MATLAB, Scilab etc.

1. Modeling in the frequency Domain.

History of control systems, Laplace transform review, transfer function of electrical , mechanical ,systems , Electric circuit analogs , Non linearities , linearization.

2. Modeling in the time domain

State space representation , converting transfer function to state space and state space to transfer function , linearization , time response , poles, zero and system response, response of first , second and general second order system, system response with additional poles additional zeros , effect of non linearities upon time response , Laplace transform solution of state equations . Time domain solution of state equations.

3. Reduction of multiple sub systems and stability

Introduction, Block diagram analysis and design of feed back systems, signal flow graph, mason's rule, signal flow graphs of state equation, similarity transformation, Routh criterion for stability, stability in state space.

4. Steady state error

Introduction, steady state error for unity feedback systems, static error constants, and system type, steady state error specifications, steady state error for disturbances non unity feed back systems, sensitivity, steady state error for systems in state space.

5. Root locus techniques and design:-

Sketching the root locus, transient response design via gain adjustment, Root locus for positive feed back system, pole sensitivity, cascade compensation, feed back compensation, physical realization of compensation.

6. Frequency response technique and design

Bode plot Nyquist criterion , stability , gain margin , phase margin via the nyquist diagram and bode plots , relation between closed loop transient and closed loop frequency response , Relation between closed loop and open loop frequency response, Relation between closed loop transient and open loop frequency response , steady state error characteristics from frequency response, systems with time delay, obtaining transfer function experimentally, transient response via Gain Adjustment lag, lead, lag-lead compensation.

7. State space Design

Controller design, Controllability, observer design, observability, steady state error design via Integral control.

8. Digital Control Systems :-

Introduction , The Z transform , transfer function , Block diagram reduction stability , steady state errors , transient response on the z plane , gain design on the z plane , cascade compensation via the S plane , Implementing the digital compensator.

Text Book: - Norman S. Nise Control system Engg. 3 rd Eddition , John Wiley and sons 2000

Reference Books:-

1. Franklin Powel Feedback Control Dynamic system 5th Edition Pearson Education 2002
2. Dorf and Bishop, Modern Control system 8th Edition Adison Wesley Longman 1998
3. K. Ogata modern Control Engg Eastern economy 3rd Edition
4. M. Gopal Tata Mc Graw Hill Control system principles and Design 2nd Edition 2002.
5. Nagrath Gopal Control Systems
6. Stephnopoulos. Chemical Process Control Prentice Hall of India

Experiments:- Application of software packages to grasp the concepts of poles , zeros , T/F time and frequency response , assignments of state as required in modeling

★★★★★ B+

T.E. (Electrical) Engineering Part-II

4. Communication systems

Teaching Scheme :

Lectures : 4 Hours /Week

Practical : 2 Hours/Week

Examination Scheme:

Paper : 100 Marks

T.W. : 25 Marks

Note :-

The emphasis here is on fundamentals rather than examples and specific technologies which often have short lifetimes. The necessary background is covered in the S.E. Pt. I in the subject signals and systems. So the topics 2 and 3 should be reviewed as needed.. Use of software packages should be emphasized. Term work and some experiments should be based on software packages.

1. Overview of Electrical Communication

2. Introduction to Signals

Size of a signal , classification of signal , signal operations, unit impulse function , signals and vectors, correlation, orthogonal signal sets, Fourier series.

3. Analysis and Transmission of Signals

Fourier transform, signal transmission through a linear system, ideal and practical filters, signal distortion over a communication channel, signal energy , signal power, numerical computation of Fourier transform.

4. Amplitude Modulation

Baseband and carrier communication, amplitude modulation -DSB, AM, QAM,SSB,VSB, carrier acquisition , superheterodyne AM receiver, television

5. Angle Modulation

Concept of instantaneous frequency , bandwidth of angle modulated waves, generation of FM waves, demodulation of FM , interference in angle modulated systems , FM receiver.

6. Sampling and Pulse Code Modulation

Sampling theorem, pulse- code modulation , differential pulse code modulation , delta modulation.

7. Digital Data Transmission

Basic digital communication system, line coding , pulse shaping, scrambler, regenerative repeater, detection -error probability, M- ary communication , digital carrier systems digital multiplexing.

8. Some Recent Development

Cellular telephone , spread spectrum systems, transmission media , public switched telephone network

9. Information theory and coding

Measure of information , source encoding error free communication over a noisy channel , channel capacity of a discrete memory less channel, practical communication systems in light of Shanon's equation, linear block codes

Text Book

B.P. Lathi Modern Digital and Analog Communication systems 3 rd Eddition
Oxford University Press 1998.

Reference Books

1. L.F. Frangel Communication Electronics
Tata Mcgraw Hill 2002
2. J.G. Proakis, Salahi Contemporary Communication systems using MATLAB

★★★★★ B+

T.E. (Electrical) Engineering Part-II

5. Power Electronics

Teaching Scheme :

Lectures : 4 Hours /Week

Practical : 2 Hours/Week

Examination Scheme:

Paper : 100 Marks

T.W. : 25 Marks

POE : 50 Marks

1. Power Semiconductor Drives:-

Characteristics, Rating , Cooling protection drive circuits, turn-on, turn off requirement, safe operating area ind, series , parallel connection of the following devices.

1. Diode
2. Thyristor
3. Triac
4. Mosfet
5. G.T.O.
6. IGBT

Introduction to SIT , MCT IG CT

2. Diodes and phase controlled converters

Single phase full wave and three phase full wave diode bridge with resistive , resistive and inductive and RLE load.

2 Pulse , 3 pulse , 6 pulse and 12 pulse controlled converters with R,RL and RLE load

Continuous and discontinuous conduction , full controller and half controller converters. Effect of source inductance and load inductance on the performance of the converters such as displacement factors, distortion factor total harmonic distortion etc. dual converters converter firing control methods linear firing angle control . Cosine wave crossing control , phase locked loop oscillator principle.

EMI and line power quality problems.

3. Cycloconverters:-

Single phase to single phase phase controlled cycloconverter using 3 pulse and 6 pulse converter groups. Voltage and frequency control circulating non circulating currents mode , load and line harmonics matrix converters high frequency cycloconverters.

4. Voltage Source Inverters :-

Half Bridge and Full Bridge 1 phase inverter three phase bridge inverter square wave operation frequency and voltage control . 12 step inverter , 3 phase PWM inverter , Sinoidal PWM , selected harmonic Elimination PWM minimum ripple current PWM , Hysteresis band current control PWM sigma delta modulation Three level inverters resonant inverters . Soft switched inverters PWM converter as line side rectifier

5. Current Source Inverter :-

3 phase six step current source line commutated inverter , Inverter operation modes load commutated inverters with over excited synchronous machine load . Auto sequential current fed inverter PWM inverter

6. D.C. Choppers :-

Classification of choppers , Principle of operation and Analysis single quadrant chopper 2 quadrant and 4 quadrant choppers , multiphase choppers

Reference Books:-

1. Modern Power Electronics & A.C. drives by B.K. Bose Publisher : pearson Education
2. Power Electronics By Ned Mohan Undeland Robins Publisher John Willey
3. Power Electronics by Vedam Subramayam
4. Power Electronics by M.H. Rashid
5. Power Electronics by Kanchandani

★★★★★ B+

T.E.Electrical-Structure Part-I & II/birje

SURESH P. SAWANT - BOS

BIRJE SR/JC