Shivaji University, Kolhapur

Electrical & Electronics Engineering Syllabi S.E. Part- I & II

(Semester III to IV) SYLLABI

(Structure Semester III to VIII)

Introduced From July 2011 Onwards

Shivaji University, Kolhapur

Implemented From July 2011

Syllabus Structure of Second Year (Semester III)
Electrical & Electronics Engineeering
Scheme of Teaching and Examination

S.E.-Part-I (SEM- III)

Sr. No.	Subject	Teaching scheme(Hrs)				Examination Scheme(Marks)				
		L	T	P	TOTAL	THEORY	TW	POE	OE	TOTAL
1	ENGINEERING MATHEMATICS-III	3	1	--	4	100	25	--	--	125
2	DIGITAL ELECTRONICS AND LINEAR INTEGRATED CIRCUITS	4	-	2	6	100	25	25	--	150
3	ELECTRICAL CIRCUIT ANALYSIS	4	1	2	7	100	25	50	--	175
4	ELECTRONIC CIRCUIT ANALYSIS AND DESIGN	4	1	2	7	100	25	50	--	175
5	POWER SYSTEMS-I	3	-	--	3	100	25	--	-	125
6	INTRODUCTION TO CIRCUIT SIMULATION	1	--	2	3	-	25	--	25	50
	TOTAL	19	3	8	30	500	150	125	25	800

Shivaji University, Kolhapur

Syllabus Structure of Second Year (Semester IV)
Electrical & Electronics Engineeering
Scheme of Teaching and Examination

S.E.-Part-II (SEM- IV)

Sr. No.	Subject	Teaching scheme(Hrs)				Examination Scheme(Marks)				
		L	T	P	TOTAL	THEORY	TW	POE	OE	TOTAL
1	ELECTRIC MACHINE -I	4	--	2	6	100	25	50	--	175
2	POWER SYSTEMS-II	4	1	--	5	100	25	--	25	150
3	ELECTRICAL & ELECTRONIC MEASUREMENT	4	-	2	6	100	25	-	--	125
4	SIGNALS AND SYSTEM	4	1	-	5	100	25	-	--	125
5	MICROPROCESSORS AND PERIPHERIALS	4	-	2	6	100	25	50	--	175
6	ELECTRICAL AND ELECTRONICS WORKSHOP	--	--	2	2	--	25	--	25	50
	TOTAL	20	2	08	30	500	150	100	50	800

Shivaji University, Kolhapur

Syllabus Structure of Third Year (Semester V)
Electrical & Electronics Engineeering
Scheme of Teaching and Examination

T.E.-Part-I (SEM- V)

Sr. No.	Subject	Teaching scheme(Hrs)				Examination Scheme(Marks)				
		L	T	P	TOTAL	THEORY	TW	POE	OE	TOTAL
1	ELECTRIC MACHINE-II	4	--	2	6	100	25	50	--	175
2	POWER SYSTEMS ANALYSIS	4	--	2	6	100	25	--	25	150
3	ELECTROMAGNETIC ENGINEERING	4	1	--	5	100	25	--	--	125
4	CONTROL SYSTEM	3	--	2	5	100	25	-	--	125
5	POWER ELECTRONICS	4	-	2	6	100	25	25	--	150
6	MINI PROJECT	--	--	2	2	-	50	25	-	75
	TOTAL	19	1	10	30	500	175	100	25	800

Shivaji University, Kolhapur

Syllabus Structure of Third Year (Semester VI)
Electrical & Electronics Engineeering
Scheme of Teaching and Examination

T.E.-Part-II (SEM- VI)

Sr. No.	Subject	Teaching scheme(Hrs)				Examination Scheme(Marks)				
		L	T	P	TOTAL	THEORY	TW	POE	OE	TOTAL
1	POWER SYSTEM STABILITY AND CONTROL	4	--	2	6	100	25	--	--	125
2	ELECTRICAL DRIVES AND CONTROL	4	--	2	6	100	25	50	--	175
3	MICROCONTROLLER AND ITS APPLICATIONS	4	--	2	6	100	25	50	--	175
4	COMMUNICATION ENGINEERING	3	1	--	4	100	25	--	--	125
5	DIGITAL SIGNAL PROCESSING	3	1	2	7	100	25	25	--	150
6	SEMINAR	--	--	2	2	-	50	--	--	50
	TOTAL	18	2	10	30	500	175	125	--	800

*Seminar should be based on the topic related with last year project

** Student should undergo minimum 15 days industrial training during summer vacation and submit the report attested by the competent authority from concerned industry which will be evaluated in fist semester of final Year Engineering.

Shivaji University, Kolhapur

Syllabus Structure of Final Year (Semester VII)
Electrical & Electronics Engineeering
Scheme of Teaching and Examination

B.E.-Part-I (SEM- VII)

Sr. No.	Subject	Teaching scheme(Hrs)				Examination Scheme(Marks)				
		L	T	P	TOTAL	THEORY	TW	POE	OE	TOTAL
1	SWITCHGEAR & PROTECTION	4	1	2	7	100	25	50	--	175
2	CONTROL SYSTEM DESIGN	4	1	2	7	100	25	50	--	175
3	FACTS	4	1	--	5	100	25	--	--	125
4	INDUSTRIAL MANAGEMENT AND ECONOMICS	4	--	--	4	100	--	--	--	100
5	ELECTIVE I*	4	1	--	5	100	25	--	--	125
6	PROJECT-I.	-	-	2	2	--	50	50	--	100
	TOTAL	20	4	6	30	500	150	150	--	800

List of the Elective Subjects:

ELECTIVE –I *

1) EHVAC
2) Robotics
3) Electrical system modeling.
4) Neural Network &Fuzzy Logic
5) Nonlinear and Digital Control Systems

Shivaji University, Kolhapur

Syllabus Structure of Final Year (Semester VIII)
Electrical & Electronics Engineeering
Scheme of Teaching and Examination

B.E.-Part-II (SEM- VIII)

Sr. No.	Subject	Teaching scheme(Hrs)				Examination Scheme(Marks)				
		L	T	P	TOTAL	THEORY	TW	POE	OE	TOTAL
1	ELECTRICAL MACHINE DESIGN	4	1	2	7	100	25	50	--	175
2	UTILIZATION & ENERGY CONSERVATION	4	1	2	7	100	50	--	--	150
3	EMBEDDED SYSTEMS	4	1	2	7	100	25	25	--	150
4	ELECTIVE II*	4	1	--	5	100	25	--	--	125
5	PROJECT-II.	--	--	4	4	--	100	100	--	200
	TOTAL	16	4	10	30	400	225	175	--	800

List of the Elective Subjects:

ELECTIVE –II*

1) HVDC
2) Power System Harmonics
3) Electrical & Electronic Materials
4) VLSI Design

ELECTRICAL & ELECTRONICS ENGINEEERING
SEMESTER – III
1. ENGINEERING MATHEMATICS-III

Teaching scheme:	Examination Scheme:
Lectures: 3 hours/week	Theory: 100 marks
Tutorial: 1 hour/week	Term Work: 25 marks

Objectives:

- Mathematics is a tool for engineers.
- Application of mathematics to study various concepts of Electrical & Electronics Engineering.
- Use of different transforms, operators to learn engineering applications.

SECTION -I

1: Linear Differential Equations: Linear Differential Equations with constant Coefficients, Homogenous Linear differential equations, method of variation of Parameters. [6]

2: Application of Linear Differential Equations: Application of Linear Differential Equations with constant coefficients to Electrical & Electronics circuits [5]

3: Partial Differential Equations: Four standard forms of partial differential Equations of first order. [4]

4: Fourier Series: Definition, Euler‟s formulae, conditions for a Fourier expansion, Fuctions having points of discontinuity, change of interval, expansions of odd & even Periodic functions, Hall range series. [5]

SECTION –II

5: Laplace Transform: Definition, properties of Laplace transforms, transforms of derivatives, transforms of integral, Inverse Laplace transforms (convolution theorem & Partial fractions.)

[5]

6: Laplace Transform of Special Function: Laplace transform of impulse Function, Unit step function, periodic function, Applications of Laplace transforms to Linear differential equations (Electric circuit problems) [4]

7: Z Transform: Z- transform of elementary functions, properties of Z transform and inverse

Z -transform. [5]

8 Vector Differentiation: Differentiation of vectors, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function, Irrotational & solenoidal vector field. [6]

TOTAL NUMBER OF HOURS: 40

TERM WORK: (Minimum 8 tutorials)

Minimum 8 tutorials / assignments based on above syllabus covering all units.

Text Books:

1. A Text Book on Applied Mathematics Vol I and II by P. N. Wartikar & J. N. Wartikar.
2. Higher Engineering Mathematics by B. S. Grewal

Reference Books:

1. Engineering Mathematics by N. P. Bali
2. Advanced Engineering Mathematics by H. K. Dass
3. Advanced Engineering Mathematics by Earwain kreyszig.

ELECTRICAL & ELECTRONICS ENGINEEERING
SEMESTER – III
2. DIGITAL ELECTRONICS AND LINEAR INTEGRATED CIRCUITS

Teaching Scheme:	Examination Scheme:
Lecture-04 Hr/week	Theory-100 marks,
Practical-02 Hr/week	TW-25 marks
	POE-25 marks

Objectives:

- To study different logic families.
- To study of different digital circuits.
- To study Operational amplifier and different Linear integrated circuits.

SECTION- I

1: Binary Arithmetic & Codes: **(04)**

Binary arithmetic operations: addition, Subtraction, multiplication, Division of binary numbers, Subtraction using 2"s complement method.

Binary codes: weighted and non weighted codes, self complementary codes, BCD, Excesses-3, Gray Codes, error detecting and correcting codes, hamming codes, alphanumeric codes, ASCII Codes.

2: Boolean algebra: **(04)**

Boolean Laws and Expression using Logic Gates, Realization of different gates using Universal gates De-Morgan"s Theorem, Duality Theorems.

Standard forms: SOP, POS, Simplification of Switching function & representation (Maxterm &Minterm), Boolean expression & representation using logic gates,

Karnaugh map: Kmap Format up to 4 variables, mapping and minimization of SOP and POS expression.

3: Logic Families: **(04)**

Digital IC specification terminology, Logic families: TTL, CMOS, Interfacing of TTLCMOS & CMOS-TTL.

4. Combinational and sequential digital circuits **(08)**

Adder, code converter- BCD to Gray converter, magnitude comparator, decoder, de-multiplexer. Flip-flops, triggering of flip-flops, shift registers, ripple (asynchronous) counter, Synchronous counter, timing sequences. Counter design-using flip-flop with state diagram approach, special counter ICs

SECTION II

5 Introduction to op-amp: **(08)**

Introduction to op-amp: definition, symbol, block diagram, ideal characteristics of Op-amp, AC& analysis of dual input balanced output type differential amplifier. Comparative study of other configurations of differential amplifiers, Analysis of typical op-amp, op-amp parameters, equivalent circuit of op-amp, study of IC 741, CA3140,LM324.

6 Applications of Op-amp **(10)**

Summing, Scaling & Averaging Amplifiers, Differential amplifier, Subtractor Circuit, Instrumentation amplifier, V to I & I to V Converter, Precision Rectifiers, Log & Anti-log Amplifiers, Integrators and differentiator, Comparator, Schmitt Trigger, Window Detector, Clippers & Clampers, Peak Detectors, Sample & Hold Circuits, Analysis & Design of Square wave generator, Triangular wave generator, sawtooth wave generator. Analysis & Design of RC phase shift oscillator, RC wein bridge oscillator.

7. Specialized IC Applications **(4)**

Analog Multiplier, Phase Angle Detection, IC 555 Timer, Astable & Monostable, XR-2240 Programmable Timer Counter.

TOTAL NUMBER OF HOURS: 42

TERM WORK:

List of Experiments (Minimum 10)

1. Study of circuits and families:
AND, OR, NAND, NOR, XOR, Operations using TTL and CMOS ICs.
2. Study of flip-flop: S-R, D Type- Truth tables and K- maps.
3. Study of flip-flop: J-K, Master slave J-K- Truth tables and K- maps
4. Study of adder-half, full.
5. Study of BCD Adder, subtractor.
6. Study of MUX, DEMUX
7. Study of counters- up down, decade, synchronous, binary, BCD counter
8. Study of op-amp as an inverting & non-inverting amplifier.
9. Study of op-amp as Square generator.
11. Study of op-amp as zero crossing detector & peak detector.
12. Study of op-amp as wein bridge oscillator.
13. Study of op-amp as precision rectifier.
14 Study of op-amp as instrumentation amplifier.
15. Study of IC 555 in different modes- astable, monostable.

Text Book:

1. Digital Electronics by Malvino Leach
2. Op-Amp& Linear IC- R. Gaikwad (PHI)

Reference books:-

1 Digital Electonic by R. P. Jain
2 Digital Design, Morris Mano
3 Op-Amp& Linear Integrated Circuits- Coughlin & Driscoll (PHI)

ELECTRICAL & ELECTRONICS ENGINEEERING
SEMESTER – III
3. ELECTRICAL CIRCUIT ANALYSIS

Teaching Scheme:	Examination Scheme:
Lecture-04 Hr/week	Theory-100marks,
Practical-02 Hr/week	TW-25 marks
Tutorial-01Hr/Week	POE-50 marks

Objectives:

- To study basic concepts of circuit analysis which is the foundation for all subjects of the Electrical &Electronics Engineering discipline.
- To analyse circuits which include Single phase and three phase circuits, magnetic circuits, theorems, transient analysis and network topology etc.

1. Introduction to Electrical Circuits (10Hrs.)

Review of circuit Concept, Network topology, Definitions – Graph – Tree, Basiccutset and Basic Tieset matrices for planar networks – Loop and Nodal methods of analysis of Networks with independent voltage and current sources - Duality & Dual networks. R-L-C parameters, Voltage and Current sources , Independent and dependent Sources, Source transformation, series parallel, star-to-delta or delta-to-star transformation..

2. Network theorems (06 Hrs.)

Superposition theorem, Millman‟s theorem, Norton‟s theorem, Thevenin‟s theorem, Maximum power transfer theorem.

3. A.C Circuit Fundamentals (08Hrs.)

R.M.S and Average values and form factor for different periodic wave forms, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation – Concept of Reactance, Impedance, Susceptance and Admittance – Phase and Phase difference – concept of power factor, Real and Reactive powers – Complex and Polar forms of representation, Complex power – Locus diagrams – series R-L, R-C, R-L-C and parallel combination with variation of various parameters.

SECTION II

4. Resonance (06 Hrs.)

Resonance – series, parallel circuits, concept of band width and Q factor, Three phase circuits: Phase sequence – Star and delta connection – Relation between line and phase voltages and currents in balanced systems.

5. Transient Analysis (08 Hrs.)

Transient response of R-L, R-C, R-L-C circuits (Series combinations only) for d.c. and sinusoidal excitations – Initial conditions - Solution using differential equation approach and Laplace transform methods of solutions.

6. Network Parameters (06 Hrs.)

Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations, concept of transformed network , 2-port network parameters using transformed variables. Interconnection of two port Nerworks.

List of Experiments: Any eight experiments to be performed from following list

1. Study of Ladder Network
2. Verification of Star Delta transformation
3. Verification of Superposition and Maximum power transfer Theorem
4. Verification of Norton‟s and Thevenin‟s Theorem
5. Study of step response of R-C , R-L and R-L-C Series circuit and verification using Pspice
6. Observation of series and parallel resonance
7. Calculations of Z, Y, ABCD and Hybrid parameters of two port network
8.,9,10. Three programs of Network solution based on Pspice/ MATLAB software.

TEXT BOOKS:

1. Engineering circuit analysis – by William Hayt and Jack E. Kimmerly, Mc Graw Hill Company, 6th edition.
2. C. K. Alexander, M.N.O.Sadiku: Electrical Circuits, Second Edition Tata McGrawhill

REFERENCE BOOKS:

1. Network Analysis by Vanvalkenburg, PHI.
2. Network Theory: - N.C. Jagan & C.Lakshminarayana, B.S Publications.
3. Electrical Circuits: S.Sudhakar, P.S.M.Satyanarayana, TMH Publication.
4. Electric Circuits by A. Chakrabarthy, Dhanipat Rai & Co
5. Mittal G.K.: Network Analysis, Fourth Edition, Khanna Publication

ELECTRICAL & ELECTRONICS ENGINEEERING
SEMESTER – III
4. ELECTRONIC CIRCUIT ANALYSIS AND DESIGN

Teaching Scheme:
Lectures: 4 hrs./week
Tutorial: 1hrs/week
Practical: 2hrs/week

Examination Scheme:
Theory-100 marks
T.W.: 25 marks
POE: 50 marks

SECTION I

1 BJT and FET **Hrs**

Transistor biasing and stabilization, Stability factor, Hybrid model of transistor, AC equivalent circuit of transistor amplifier using h parameter **6**
FET, MOSFET, Types, V-I characteristics, Small signal equivalent model of FET, common source FET amplifier

2 Voltage Amplifiers **10**

Single stage RC coupled amplifier, RC coupled amplifier, Types of coupling, low frequency and high frequency response of transistor amplifier, Multistage amplifiers
General theory of negative feedback, types, effect of negative feedback
Two stage RC coupled amplifier with feedback (using BJT)
Transformer coupled amplifier

3 Power Amplifiers **8**

Parameters associated with power amplifiers, Class A, Class B, Class C amplifier, Crossover distortion, Class AB push pull amplifier
Design of complementary-Symmetry amplifier
Heat sink design for power amplifier

SECTION II

4 Oscillators

Effect of positive feedback, Barkausen Criterion, types of oscillator
RC Oscillators: Phase shift oscillator, Wien bridge oscillator with amplitude stability circuit,LC Oscillators: Colpitts and Hartley oscillator, Crystal Oscillator. **8**

5 Multivibrators

Basics of Multivibrator, types of Multvibrator: Astable Monostable, Bistable and Schmitt trigger circuit. Design of Astable, Monostable, Bistable Multvibrator and Schmitt trigger using transitors. **8**

6 Regulated Power Supply 8

Voltage regulator types: series (Transitorised and IC 723 based) and shunt
Design of transistorized series pass voltage regulator with constant current source and fold back current limit.
Three terminal voltage regulators: 78XX, 79XX, LM317 with current boosting and overload protection.

List of Experiments: (Minimum 10 Experiments)

1. Design of single stage common emitter RC coupled amplifier.
2. Design of two stage RC coupled amplifier with negative feedback.
3. Design of class AB (push-pull) power amplifier.
4. Design of phase shift oscillator.
5. Design of Wien bridge oscillator.
6. Design and simulation of Colpitts oscillator.
7. Design and simulation of Harley oscillator.
8. Design of astable multivibrator, monostable multivibrator and Schmitt trigger using Transitor.
9. Design of transistorized series pass voltage regulator.
10. Design of constant current source using three terminal regulator ICs like 7805, 7812 etc.
11. Design of variable voltage regulator using LM317 with current boosting and overload protection.
12. Design of any one application using FET.

Text Books:

1. *"Electronics Principles",* A. P. Malvino.
2. *"Practical Transistor Circuit Design",* Gerald E. Williams, TMH.
3. *"Electronic Devices and Circuits",* Allen Mottershed, PHI.

Reference Books:

1. "Electronic Circuit Design and Analysis", D. A. Neaman, TMH.
2. "Electronic Devices and Circuits", R. Boylestad & L. Nashelsky, PHI.
3. "Electronic Devices and Circuits", Millman and Halkias, TMH.

ELECTRICAL & ELECTRONICS ENGINEEERING
SEMESTER – III
5. POWER SYSTEMS-I

Teaching Scheme:
Lectures: 3 hrs./week

Examination Scheme:
Theory-100 marks
T.W.: 25 marks

Objectives:

- To study the working of different power plants. To select suitable sites for different power stations.
- To define the terms used in economics of power generation and explain their relation.
- To select alternative energy sources for given conditions.

SECTION-I

1. Introduction
Conventional and non conventional sources of energy, Structure of power industry **(03)**

2. Hydro power plant
Rainfall, run off and its measurement, hydrograph, flow Duration curve mass curve reservoir storage capacity, Classification of plants-run off river plant, storage river plant, Pumped storage plant **(04)**

3. Thermal power plant
Fuels and their handling, typical layout of power plant , components, Working efficiency of thermal power plant, selection criteria **(05)**

4. Nuclear power plant
Introduction of nuclear engineering –radioactive decay, half Life fission, fusion, nuclear material, thermal fission reactor And power plant – PWR BWR, liquid metal fast breeder reactors, reactor control **(05)**

SECTION-II

5. Diesel Power Stations
Applications of diesel power stations Diesel electric plant- Main components (Block Diagram) Different types of engines & their working. Operation, maintenance & trouble shooting chart of diesel plant.

(**04)**

6 Non-Conventional Energy Sources

Types of non-conventional energy sources.

Solar Energy- Potential of solar energy,Photovoltaic effect – for solar energy., Construction & materials used in solar photo-voltaic cells. Working & applications of solar energy.

Wind Energy.-Selection of site for wind mills, Principle of electricity generation with the help of wind energy Block diagram and working of Wind energy plant and its applications, List of major wind plants in the state with their approximate capacities.

Bio-mass & Bio-gas energy.-Composition of Bio-gas & its calorific value. Traditional; non-traditional Biogas plants, Bio-mass based power generation plants & their capacities. Geo-thermal Energy and its Applications.

Ocean energy.-Ocean thermal Electric conversion. Energy from tides,Site requirements Advantages and Limitations of Tidal power generation.

Fuel Cells: Construction, working and applications **(08)**

7 Economic Aspects of Power Generation (04)

Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems.

8.Tariff Methods (04)

Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a Tariff Method.-Tariff Methods: Flat Rate, Block-Rate, two-part, three –part, and power factor tariff methods and Numerical Problems

TOTAL NUMBER OF HOURS: 36

TERM WORK:

Term work consists of minimum eight assignments. A power plant visit Should be arranged and report of the same must be submitted as a part of term work .

Textbook:

1. M.V. Deshpande , *Elements of power station design* , Tata Mc Graw Hill

References:-

1. Electrical Power Systems by C.L.Wadhawa New age International (P) Limited, Publishers 1997.
2. D.H.Bacon, *Engineering Thermodynamics*, London butterworth
3. P. K. Nag, *Power plant Engineering* - stream & nuclear, Tata Mc Graw Hill
4. Fredrick T. Morse. *Power plant Engineering* , east west press private Ltd
5. Mahesh Varma : *Power plant Engineering* , Metrolitan book Co Pvt Ltd
6. George W. Sutten (Editor) : *Direct Energy Conversion* , Latur university, Electronics series Vol-3, Mc Graw hill
7. Electrical Power Generation, Transmission and Distribution by S.N.Singh., PHI, 2003
8. Electrical India Magazine

ELECTRICAL & ELECTRONICS ENGINEEERING
SEMESTER – III
6. INTRODUCTION TO CIRCUIT SIMULATION

Teaching Scheme:	Examination Scheme:
Lecture 1 Hr/week	Term work: 25marks
Practical 2Hrs/week	OE : 25 marks

Objectives:

- To study different important programming software tools
- Design of circuits using software
- To design and simulate linear circuits using Matlab.

SECTION – I

1. Introduction to MATLAB (01)

MATLAB environment, different windows in matlab, getting help, important commands, matlab as scratchpad, different types of files in matlab, complex variables and operations, plot commands

2. Matrices & vectors (02)

Matrix manipulation, matrix and array operations, arithmetic operators, relational operators, logical operators, solution of matrix equation Ax= B, Gauss elimination, inverse of matrix Eigen values and Eigen vectors, Determinant, least square solutions.

3. Branching statements, loops and programming design (02)

If statements, for loops, while, switch, Break and continue, nesting loops, if else with logical arrays, function programming.

4. Symbolic manipulation (01)

Calculus – limit, continuity, differential calculus, differential equation, integration, integral transforms & Taylor series.

SECTION – II

5. Signals manipulations (02)

Plotting standard signals, continuous and discrete such as step, ramp, sine, Generating signals from combination of different, signals and manipulation of signals.

6. Introduction to PSpice (01)

Introduction to PSpice, different windows in PSpice, tools, libraries, component properties, circuit designing in PSpice.

7. Device characteristics (01)

Plotting characteristics of semiconductor devices – diode, bipolar junction transistor, field effect transistor, UJT and SCR

8. Circuit Simulation & Introduction to PCB designing (02)

Simulation of following circuits: half wave & full wave rectifier, Zener shunt regulator, transistorized RC coupled amplifier, clipper and clamper

Introduction to PCB design

TOTAL NUMBER OF HOURS: 12

TERM WORK: Minimum five experiments each from MATLAB & PSpice are conducted based on the following list.

LIST OF EXPERIMENTS

MATLAB

1. Introduction to MATLAB Environment
2. To study simple matrix and array manipulations using Matlab
3. Programming using MATLAB
4. Calculus using MATLAB
5. To plot signals: discrete and continuous using MATLAB
6. Function programming and MATLAB
7. Signal Manipulation using MATLAB

PSpice

1. Design and simulation of resistive circuit
2. Plotting of VI characteristics of diode
3. Plotting of VI characteristics of BJT/FET
4. Plotting of VI characteristics of UJT/SCR
5. Design and simulation of half wave & full wave rectifier
6. Design and simulation of clipper and clamper circuits
7. Simulation of frequency response of a transistorized RC coupled amplifier

References:-

1. Matlab programming for Engineers by Stephen Chapman Pub Thomson Learning 2nd edition, 2002
2. Getting started with MATLAB by Rudra Pratap Pub Oxford University press
3. Contemporary linear systems using MATLAB by Robert Strum and Donald Kirk Pub Thomson Learning.
4. Mastering MATLAB by Duane Hanselman & Bruce Little field Pub Pearson Education 2005\

5. A guide to MATLAB by Brain R. Hunt, Ronald L. Lipsman & Jonathan M. Rosenberg Pub Cambridge University Press 2002

6. Linear Algebra and differential Equations using MATLAB by Martin Golubitsky, Michael Dellnitz Pub, International Thomson 1999

7. SPICE for Circuits and Electronics using PSpice by Muhammad Rashid pub PHI 2nd Edition 2003.

8. Electronic Devices & Circuit theory by Robert Boylestad & Nashelsky, PHI publications ninth edition

ELECTRICAL & ELECTRONICS ENGINEEERING

SEMESTER – IV

1. ELECTRIC MACHINE-1

Teaching Scheme:
Lectures.: 4 hr/week
Practical: 2 hr/week

Examination Scheme:
Theory: 100 Mark
Term Work: 25 Mark
POE: 50 Mark

Objectives:

- Study the D.C. machines and transformer and its application.
- To familiar with latest and current trends in all types of industries.
- To study the different FHP motors.

SECTION –I

1. DC.MACHINES: Construction of D.C. machines, magnetic circuit of d.c machines, commutator and brush arrangement, EMF equation, torque equation, power flow diagram of dc machines. (4)

2. ARMATURE WINDING: Simple lap winding and wave winding, winding diagram and tables, brush position, dummy coils (2)

3. ARMATURE REACTION: MMF due to armature winding, flux distribution due to armature current and resultant flux distribution in a machine. Demagnetization and cross magnetization ampere turns, principle of compensation, compensating winding and its use in machines. (4)

4. D.C. MOTORS: Concept of back emf, characteristics of D.C. motors, Method of speed controls, electro breaking, parallel and series operation of motor. (5)

5. TESTING OF D.C. MACHINES: Losses and efficiency, Break test, Swinburne‟s test, Hopkinson‟s test, retardation test, Field test on d.c series motor (5)

SECTION –II

6. Fractional Horse Power (FHP) motors:

Universal motor – Development of torque ,power ,rotational and transformer emf in commutator winding, commutation in universal motor, complexer diagram, circle diagram, operation on A.C. and D.C. supply, compensated winding, application.

Stepper motor – types, principle of working and applications.
Servo motor – types, principle of working and applications.

(6)

7. SINGLE PHASE TRANSFORMER: Construction and type, EMF equation phaser diagram, equivalent circuit, efficiency, losses, regulation, Experimental determination of equivalent circuit parameters and calculation of efficiency and regulation, parallel operation. (6)

8. POLY PHASE TRANSFORMER: a) Construction, single phase bank, polarity test, transformer winding, Grouping YD1, YD11, DY11, DZ1, DZ11, YZ1, YZ11 (5)

9. PERFORMANCE OF TRANSFORMERS: Switching inrush current, Harmonics in exciting current causes and effects, Harmonics with different transformers, connection, tertiary winding, oscillating neutral, Testing of transformers, heat run test, sumpners test, Equivalent delta test..

(5)

TOTAL NUMBER OF HOURS: 42

TERM WORK:

a)Minimum Eight experiment based on above syllabus.
b) Ten MATLAB exercises on software based analysis.

LIST OF EXPERIMENTS: (Minimum 08)

1. Speed control of dc shunt motor (i) Armature control method (ii) Field control method
2. Determination of efficiency of DC motor by swimbuns test
3. Determination of efficiency of DC motor by Hopinkinson.s test
4. Break test on shunt motor
5. Field test on series motor
6 Load test on compound motor I) cumulative ii) differential
7. To perform open circuit and short circuit test for determining equivalent circuit Parameter of a single phase transformer
8 Parallel operation of single phase transformer.
9. Scott connection
10. Equivalent Delta test or Heat run Test for three phase transformer.
11. DY1 and DY11 parallel and connection
12. load test on transformer (single and three phase)
13. Polarity test on transformer (single and three phase)

References:-

1. Electrical Machines by SK Bhattacharya, Tata Mc Graw Hill, New Delhi
2. Electric Machinery and Transformers (3rd Edition) by Guru, Bhag S.: Hiziroqlu, juseyin R. Oxford University Press 2001.
4. Electrical Machines by SB Gupta, SK Kataria and Sons, New Delhi
5. Electric Machine, By Fitzerald and Kingsley (Tata McGraw Hil
6.Alternating current Machines, By M.G. Say.

ELECTRICAL & ELECTRONICS ENGINEEERING
SEMESTER – IV
2. POWER SYSTEMS-II

Teaching Scheme:	Examination Scheme:
Lecture 4hrs/week	Theory 100 marks
Tutorial:1hr/week	Term work 25 marks
	OE:25 marks

Objective :

Understanding basic theory of transmission lines modeling and their performance analysis and mechanical design of transmission lines, cables and insulators.

SECTION I

1. Transmission Line Parameters (10)

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines,. Skin and Proximity effects - Description and effect on Resistance of Solid Conductors -Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line, Shunt Compensation. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference**.**

2. Performance of Short and Medium Length Transmission Lines (07)

Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.

3. Performance of Long Transmission Lines (07)

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

SECTION II

4. Overhead Line Insulators (08)

Types of Insulators, String efficiency and Methods for improvement, Numerical Problems – voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

5. **Sag and Tension Calculations (08)**

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

6. **Underground Cables (08)**

Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading.

TERM WORK:

Term work consists of minimum eight assignments. A power plant visit Should be arranged and report of the same must be submitted as a part of term work .

TEXT BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.

2. Electrical power systems - by C.L.Wadhwa, New Age International (P) Limited, Publishers,1998.

REFERENCE BOOKS:

1. Power system Analysis-by John J Grainger William D Stevenson, TMC Companies, 4th edition
2. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
3. Power System Analysis by Hadi Saadat – TMH Edition..
4. Modern Power System Analysis by I.J.Nagaraj and D.P.Kothari, Tata McGraw Hill, 2nd Edition.

ELECTRICAL & ELECTRONICS ENGINEEERING
SEMESTER – IV
3. ELECTRICAL & ELECTRONIC MEASUREMENT

Teaching Scheme:	Examination Scheme:
Lectures.: 4 hr/week	Theory: 100 Mark
Practical: 2 hr/week	Term Work: 25 Mark

Objectives:

- Identify the measuring instruments used for measuring electrical quantities. To study different instrumentation transformer.
- Classify measuring instruments based on construction, principle of operation and Quantity to be measured, types of errors.

SECTION –I

1. BASIC CONCEPT OF MEASUREMENT: International Standards, Primary Standards, secondary Standards, Working Standards., Types of Error, Type of Uncertainties. uncertainty measurement method, direct method and comparison method

(5)

2. MOVING COIL INSTRUMENTS: a) Moving coil instrument: scale and pointer, moving coil, damper and restoring spring ,Bearing and suspensions, magnetic path, Properties of damped mass spring system : Step response, theoretical analysis of the step response, determination of torque intertia, Determination of damping constant, Damping of Galvanometer. linear and non Linear scales.Multi range ammeter and voltmeter. : Shunting technical realization of a multi Range ammeter, calculation of current divider circuit, Voltmeter, series resistor technical realization of a multi range voltmeter, calculation of series resistance

(10)

3. MOVING IRON INSTRUMENT: Construction and principle of operation of attraction and Repulsion type, limitation, scale equation of moving iron for power factor measurement, synchronoscope. (5)

4 POWER AND ENERGY MEASUREMENT : Dynamometer wattmeter, power factor measurement, power measurement in single phase circuit, active and reactive power measurement in three phase circuit using wattcmeters, Construction and working principle of single phase and Three phase energy meter, Error and their compensation, Three phase Trivector meter .

(6)

SECTION –II

5 MEASUREMENT OF CIRCUIT PARAMETERS: A.C. Bridges: measurement Of Inductance and Capacitance, frequency measurement, Methods of measurement of low, medium and high range resistance. Whetstone and slide wire bridge. (6)

6 MEASUREMENT USING DIGITAL INSTRUMENTS: Digital meters: Ammeter, Voltmeter, multimeter, Wattmeter, Energy meter. Basic circuitry of Electronic counter, frequency measurement using electronic counter. (6)

7 ADVANCED MEASUREING INSTRUMENT: Digital Oscilloscope, wave and spectrum analyzer, Harmonic distortion analyzer (6)

8 C.T. and P.T: Construction and working principle, phasor diagram, application of C.T. and P.T. (4)

TOTAL NUMBER OF HOURS: 48

TERM WORK:

Minimum Eight experiment from following
list. LIST OF EXPERMENTS:
1 Measurement of power by two wattmeter method
2. Measurement of reactive power.
3. Calibration of single phase and three phase Energy meter.
4. Measurement of inductance by using bridges
5. Measurement of capacitance by using bridges
6. Study of measuring instruments (M.I., PMMC)
7. Measurement of power by ammeter and voltmeter.
8. Measurement of KVAR, KVA, KW by using Trivector meter.
9. Measurement of high resistance by loss of charge method..
10. Study of digital meters
11. Study of C.T. and P.T
12. Study of Harmonic distortion analyzer

Textbooks:

1)Electrical & Electronic Measurement E.W.Golding ELBS Edition
2)Electrical & Electronic Measurement -- A.K.Sawhney

References:-

Instrumentation Devices & Systems --- Rangan,Mani ,Sharma
Process Control Instrumentation Technology – Johnson
Industrial Instrumentation and Control – S.K.Singh
Electrical measurement and measuring Instrumentation - G.P.Gupta.

ELECTRICAL & ELECTRONICS ENGINEEERING
SEMESTER – IV

4. SIGNALS AND SYSTEM

Teaching Scheme:	Examination Scheme:
Lecture 4hrs/week	Theory 100 marks
Tutorials 1hr/week	Term work 25 marks

Objectives:

- To study the different transform of signal and their operations.
- To study the operation of signal in different domains.
- To study the DTFT analysis.

SECTION I

1. Introduction to Signals and System **6**

Definition of signal , Classification of signals, Some useful signals in discrete and continuous time domain, Energy and power signals, properties of CT/DT signals, time based transformations of CT/DT signals (Scaling and shifting etc), System modeling, Classification of systems (Linear/Non linear, Static /Dynamic ,Time variant /Time invariant etc).

2. Time Domain Analysis of Continuous and Discrete Time Systems **8**

Solution to Differential and Difference equation, Zero input response (Natural Response) and Zero state response (Forced Response), Impulse Response, Convolution in discrete and Continuous time domain, Properties of convolution, Stability of system, Correlation, Auto and cross correlation and its properties.

3. Fourier Domain Analysis of Continuous Time Signal **10**

Signal representation by orthogonal signal space, Trigonometric, Cosine (Compact Trigonometric) , Exponential Fourier series coefficients for periodic signals and their interrelationship, Existence of Fourier series, Properties, Gibb‟s phenomenon, Parseval‟s

Theorem, Computing harmonic distortion, LTI system response for periodic input, Apeiodic signal representation by Fourier integral, Fourier trans of some standard signals, properties of

Fourier transform, Fourier transform of periodic signal, Parseval‟s Theorem (Fourier transform domain), Modulation, LTI system analysis with Fourier transform.

SECTION II

4. Laplace Transform Analysis of Signals and System 8

Convergence of Laplace Transform, Properties of Laplace transform, Inversion of Laplace Transform, Solution to differential and Integro- differential equation, Analysis of electrical networks, Stability analysis, Realization of system in direct form – I and Direct form – II.

5. Fourier Domain Analysis of Discrete Time Signal 8

Sampling theorem, Aliasing, Periodic signal representation by discrete time Fourier series, Apeiodic signal representation by Fourier integral, Properties of discrete time Fourier transform (DTFT), relation between DTFT and Fourier Transform, Discrete Fourier Transform (DFT), Inverse Discrete Fourier Transform (IDFT), Properties, Circular Convolution.

6. Z Transform Analysis of Discrete Time Signals and Systems 8

Z- transform of sequences, Region of convergence and its properties, Inverse Z transform methods, relationship between Z transform and DTFT, Solution to difference equation, Relationship between S domain and Z domain, stability criteria, System realization in Direct form –I , II , cascaded and Parallel form.

TOTAL NUMBER OF HOURS: 48

TERM WORK: (Minimum 8 tutorials)

all units. Minimum 8 tutorials / assignments based on above syllabus covering

References:-

1. Linear systems and signals by B. P. Lathi, pub Oxford University press, 2nd Edi, 2005
2. Signals and systems by M. J. Roberts pub Tata Macgraw Hill 2005
3. Signals and systems by Simon Haykin pub Wiley 2003
4. Signals and systems by C. T. Chen pub Oxford 3rd Edition 2004.

ELECTRICAL & ELECTRONICS ENGINEEERING
SEMESTER – IV
5. MICROPROCESSOR AND PERIPHERALS

Teaching Scheme:	Examination Scheme:
Lectures- 04 hrs / week	Theory – 100 marks
	TW- 25 marks
Practical - 02 hrs / week	POE- 50 marks

Objectives:

- To study of Semiconductor memories.
- Study of 8085 (Microprocessor) & peripheral chips.
- To study of different interfacing ICs.

SECTION I

1: Introduction & Overview: (3 Hrs)

Review Basic Structure of Computer system. Introduction to general purpose CPU, Architecture.

2: Semiconductor Memories (4 Hrs)

Memory Capacity, Memory Organization, Speed, Memory Types-RAM, ROM, PROM, EPROM, EEPROM, Memory Address Decoding. Battery Backup.

3: Introduction to 8085: (17 Hrs)

Study of interfacing chips 8205,74138, 74373. Introduction to 8085, CPU Architecture, Register Organization, 8085 Instruction Set, Addressing modes. Stack & Subroutines, Instruction Cycle, machine Cycle, Timing Diagrams (Graphical representation), Wait, Hold & Halt States, and Interrupts of 8085(Hardware and software). Assembly Language Programming.

SECTION II

4: Interfacing I/Os: (3 Hrs)

Concept of I/O ports, Memory mapped I/O and I/O mapped I/O schemes, I/O instructions, data Transfer Techniques interrupt Driven I/O.

5: Study of Peripherals (15 Hrs)

a. Programmable I/O- 8255
b. Timer-8155,8253
c. Keyboard/Display Controller-8279
d. serial communication controller-8251
e. Interrupt controller-8259

6: Real World Interfacing: (6 Hrs)

Interfacing of Memory, keyboard, seven segment display, Relay, stepper motor, Conversion techniques such as ADC Techniques: Dual Slope & Successive Approximation and DAC Techniques: Weighted resistor & R-2R Ladder, ADC -0809/7109, DAC- 0808.

TOTAL NUMBER OF HOURS: 48

TERM WORK:

1.50% Assembly language programs based on Assembler & Simulator softwares.
2.25% Assembly language programs based on Hardware (kit system)
3. 25% Assembly language programs based on Interfacing (kit + Interfacing cards)

References:-

1. Kenneth L Short –„Microprocessors and Programmed logic„
2. Douglas V Hall- „Microprocessors and Digital Systems"
3. Ramesh S Gaonkar- „Microprocessors Architecture, Programming and applications with 8085A

ELECTRICAL & ELECTRONICS ENGINEEERING
SEMESTER – IV
6. Electrical & Electronics Workshop

Teaching Scheme:
Practical: 02 hrs / week

Examination Scheme:
TW- 25 marks
OE:25 marks

Objectives:

- To study the design of different electrical equipments.
- To study the design of different electronic equipments.
- To study the domestic wiring.
- To study the PCB design.

SECTION I

1. a. Familiarization of wiring tools, lighting and wiring accessories, various types of Wiring systems

b. Wiring of one lamp controlled by one switch.

2. a. Study of Electric shock phenomenon, precautions, preventions; Earthing

b. Wiring of one lamp controlled by two SPDT Switches and one 3 pin plug socket independently

3. a. Familiarization of types of Fuse, MCB, ELCB etc.

b. Wiring of fluorescent lamp controlled by one switch from panel with ELCB & MCB.

4. a. Study of estimation and costing of wiring

b. Domestic appliance – Wiring, Control and maintenance: Mixer machine, Electric Iron, fan motor, pump motor, Battery etc.

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SECTION II

5. a. Familiarization of electronic components colour code, multimeters.

b. Bread board assembling - Common emitter amplifier.

6. a. Study of soldering components, solders, tools, heat sink.

b. Soldering practice.

c. Study of estimation and costing of soldering.

d. Domestic appliances – Wiring PCB, control, Identification of fault: Electronic Ballast, Fan regulator, inverter, UPS etc.

TERM WORK:

Minimum 8 practicals/Handson practice based on above syllabus covering all units.

References:-

1. K B Raina & S K Bhattacharya: Electrical Design Estimating and costing, New Age International

Publishers, New Delhi, 2005 Uppal S. L., Electrical Wiring & Estimating, Khanna Publishers---5th edition,2003

2. John H. Watt, Terrell Croft :American Electricians' Handbook: A Reference Book for the Practical

Electrical Man - McGraw-Hill, 2002

3. G. Randy Slone - Tab Electronics Guide to Understanding Electricity and Electronics, Mc-GrawHill, 2000

4. Jerry C Whitaker - The Resource Handbook of Electronics, CRC Press-2001