SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF ENGINEERING & TECHNOLOGY

ELECTRICAL ENGINEERING

Syllabus Structure for

S.E. (Electrical Engineering) w.e.f. Academic Year 2013-14

T.E. (Electrical Engineering) w.e.f. Academic Year 2014-15

B.E. (Electrical Engineering) w.e.f. Academic Year 2015-16

PROGRAMME: BACHLOR OF ELECTRICAL ENGINEERING

PROGRAMME OBJECTIVES

1. To develop an ability to understand the basic concepts of fundamental laws in electrical circuits and their applications in the working principle of electrical apparatus.
2. To introduce students about the power generation, transmission, distribution and utilization of electrical energy and their controls.
3. To develop an application oriented understanding amongst the students about electrical energy utilization.
4. To develop an analytical skills amongst the students about electrical systems used in power sector and various industries.

PROGRAMME OUTCOME

Students attain the following outcomes:

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data,
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multidisciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in life-long learning,
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Electrical Engineering
Structure of S.E. (Electrical Engineering)
w.e.f. 2013-14

Semester –I

Sr. No.	Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	TH	TW	POE	OE	Total
1.	Engineering Mathematics-III	4	1	--	5	100	25	--	--	125
2.	Electrical Machine-I	4	--	2	6	100	25	50	--	175
3.	Electronic Devices and Circuits	4	--	2	6	100	25	--	--	125
4.	Electrical Measurement & Instrumentation	4	--	2	6	100	25	50	--	175
5.	Power Plant Engineering	3	1	--	4	100	25	--	--	125
6.	MATLAB Programming	1	--	2	3	--	25	--	--	25
	Total	**20**	**2**	**8**	**30**	**500**	**150**	**100**	**--**	**750**
7.	Environmental Science	1	--	--	1	--	--	--	--	--

Semester –II

Sr. No.	Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	TH	TW	POE	OE	Total
1.	Numerical Methods & Computer Programming	3	--	2	5	100	25	--	--	125
2.	Electrical Machine-II	4	--	2	6	100	25	50	--	175
3.	Elements of Power Systems	4	1	--	5	100	25	--	25	150
4.	Analog & Digital Integrated Circuits	4	--	2	6	100	25	--	--	125
5.	Network Analysis	4	--	2	6	100	25	--	25	150
6.	Simulation of Electrical Circuits by Matlab	--	--	2	2	--	25	--	--	25
	Total	**19**	**1**	**10**	**30**	**500**	**150**	**50**	**50**	**750**
7.	Environmental Science	1	--	--	1	--	--	--	--	--

Note –

- Batch size for the practical /tutorial shall be of 20 students. On forming the batches, if the strength of remaining students exceeds 9, then a new batch shall be formed.
- Vocational Training (evaluated at B.E. Part-I) of minimum 15 days shall be completed in any vacation after S.E. Part-II but before B.E. Part-I & the report shall be submitted and evaluated in B.E. Part-I
- Appropriate Elective I & II Subjects may be added when required.
- Student shall select one Self Learning Module at T.E. Part I and T.E. Part II each from Technical and Humanities and Social Sciences Group with at least one Self Learning Module from the Humanities and Social Sciences Group
- Curriculum for Humanities and Social Sciences Self Learning Modules is common for all under graduate programmes of faculty of Engineering and Technology
- Term work assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable

SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Electrical Engineering

Structure of T.E. (Electrical Engineering)

w.e.f. 2014-15

Semester-I

Sr. No.	Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	TH	TW	POE	OE	Total
1.	Power System Analysis	4	--	2	6	100	25	--	25	150
2.	Engineering Economics and Industrial Management	4	1	--	5	100	25	--	--	125
3.	Electromagnetic Engineering	4	1	--	5	100	25	--	--	125
4.	Electrical Machine-III	4	--	2	6	100	25	50	--	175
5.	Control Systems-I	4	--	2	6	100	25	--	25	150
6.	Electrical Workshop	--	--	2	2	--	25	--	--	25
7.	Self Learning Module I	--	--	--	--	50	--	--	--	50
	Total	**20**	**02**	**08**	**30**	**550**	**150**	**50**	**50**	**800**

Semester –II

Sr. No.	Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	TH	TW	POE	OE	Total
1.	Control System-II	4	--	2	6	100	25	--	--	125
2.	Electrical Machine Design	4	--	2	6	100	25	--	25	150
3.	Power Electronics	4	--	2	6	100	25	50	--	175
4.	Signals & Systems	3	1	--	4	100	25	--	--	125
5.	Microprocessor & Microcontroller	4	--	2	6	100	25	--	--	125
6.	Mini Hardware Project (Project Based Learning)	--	--	2	2	--	50	--	--	50
7.	Self Learning Module II	--	--	--	--	50	--	--	--	50
	Total	**19**	**01**	**10**	**30**	**550**	**175**	**50**	**25**	**800**

Note –

- Batch size for the practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining students exceeds 7, then a new batch shall be formed.
- Vocational Training (evaluated at B.E. Part-I) of minimum 15 days shall be completed in any vacation after S.E. Part-II but before B.E. Part-I & the report shall be submitted and evaluated in B.E. Part-I
- Appropriate Elective I & II Subjects may be added when required.
- Student shall select one Self Learning Module at T.E. Part I and T.E. Part II each from Technical and Humanities and Social Sciences Group with at least one Self Learning Module from the Humanities and Social Sciences Group
- Curriculum for Humanities and Social Sciences Self Learning Modules is common for all under graduate programs of faculty of Engineering and Technology
- Project group for T.E.(Electrical) Part I Mini Project shall not be of more than **four** students
- Project group for B.E.(Electrical) Part I and Part II shall not be of more than **four** students.
- Term work assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable

SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Electrical Engineering
Structure of B.E. (Electrical Engineering)
w.e.f. 2015-16

Semester –I

Sr. No.	Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	TH	TW	POE	OE	Total
1.	Electrical Drives and Control	4	--	2	6	100	25	50	--	175
2.	Switchgear & Protection	4	--	2	6	100	25	--	50	175
3.	Electrical Utilization	4	--	2	6	100	25	--	--	125
4.	Elective – I	4	--	2	6	100	25	--	--	125
5.	Project Phase-I & Seminar	--	--	6	6	--	50	--	50	100
6.	Vocational Training	--	--	--	--	--	50	--	--	50
	Total	**16**	**--**	**14**	**30**	**400**	**200**	**50**	**100**	**750**

Elective – I

1. PLC and SCADA
2. Digital Signal Processing
3. Energy Audit & Management
4. Biomedical Instrumentation

Semester –II

Sr. No.	Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	TH	TW	POE	OE	Total
1.	Flexible AC Transmission System and HVDC Transmission	4	--	2	6	100	25	--	--	125
2.	Electrical Installation, Testing and Maintenance	4	--	2	6	100	25	--	50	175
3.	Power System Operation & Control	4	--	2	6	100	25	--	--	125
4.	Elective – II	4	--	2	6	100	25	--	--	125
9.	Project Phase-II	--	--	6	6	--	50	--	150	200
	Total	**16**	**--**	**14**	**30**	**400**	**150**	**--**	**200**	**750**

Elective – II

1. Power System Dynamics
2. High Voltage Engineering
3. Renewable Energy Sources
4. Power Quality

Note –

- Batch size for the practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining students exceeds 7, then a new batch shall be formed.
- Vocational Training (evaluated at B.E. Part-I) of minimum 15 days shall be completed in any vacation after S.E. Part-II but before B.E. Part-I & the report shall be submitted and evaluated in B.E. Part-I
- Appropriate Elective I & II Subjects may be added when required.
- Project group for B.E. (Electrical) Part I and Part II shall not be of more than **four** students.
- Term work assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable

DETAILED SYLLABUS

FOR

S.E. ELECTRICAL ENGINEERING

PART - I

Solapur University, Solapur

S.E Electrical Semester-I

ENGINEERING MATHEMATICS-III

Teaching Scheme	Examination Scheme
Theory: - 4 Hrs/Week	**Theory -** 100 Marks
Tutorial: - 1 Hr/Week	**Term Work -** 25 Marks

Course Objectives

1) To study & understand linear & partial differential equations.
2) To study & understand Z & Laplace transforms and their applications.
3) To study & understand Fourier series & vector calculus and their applications.

Course Outcome

Students will be able to implement above mathematical tools to analyze electrical circuits & systems.

SECTION-I

Unit 1: Linear Differential Equations **(10 hrs)**

Linear Differential equations with constant coefficients (without method of variation of parameters) Legendre's Linear equations, Electrical Engineering Applications

Unit 2: Partial Differential Equations **(08 hrs)**

Four standard forms of Partial Differential equations of first order, Solution of partial differential equations by method of separation of variables

Unit 3: Z-Transform: **(08 hrs)**

Z-Transform of elementary Functions, Properties of Z-Transform and Inverse Z-Transform

SECTION II

Unit 4: Fourier series: **(08 hrs)**

Definition, Euler's formula, Expansions of function, Change of interval, even and odd functions, half range Fourier series

Unit 5: Laplace Transform: **(10 hrs)**

Definition, Transform of standard function, Properties, Transform of derivative and integral, Inverse Laplace Transform, Convolution Theorem. Applications to solve linear Differential equations with constant Coefficients

Unit 6: Vector Calculus: **(08 hrs)**

Differentiation of vectors, tangent line to the curve, velocity and acceleration, Gradient, Divergence and Curl of vector field, Solenoid, conservative vector field

Term Work shall consist of minimum six assignments/tutorials based on above curriculum

Text Books:

1. J.N. and P.N. Wartikar, "A textbook of Applied Mathematics Vol. II", Vidyarthi Grah Prakashan, Pune.
2. B.S.Grewal, "Higher Engineering Mathematics" , Khanna Publications, Delhi.
3. Kreyzig-John, "Advanced Engineering Mathematics", Wiley & SMS, Newyork

Reference Books:

1. Peter O'Neil, "Advanced Engineering Mathematics", Cengage Learning
2. B.V. Ramana, "Higher Engineering Mathematics" , Tata McGraw-Hill Education

*****

Solapur University, Solapur

S.E Electrical Semester-I

ELECTRICAL MACHINES-I

Teaching Scheme	Examination Scheme
Theory: - 4 Hrs/Week	**Theory-** 100 Marks
Practical: - 2 Hrs/Week	**Term-Work -** 25 Marks
	POE - 50 Marks

Course Objectives

1) To get detailed knowledge of construction, operating principles of DC machines and transformer.
2) To find equivalent circuit parameters and performance parameters for transformer and DC machines.
3) To understand different testing methods of DC Machines.

Course Outcome

1) Student will be able to analyze performance of DC generators and motors.
2) Student will be able to examine performance of single phase and three phase transformer.
3) Students will be able to identify applications of DC machines & transformer in power sector.

SECTION-I

Unit 1: DC Generators: (10 Hrs)

Construction of armature and field systems, Basic Principle of working, EMF equation, Types of Armature windings, winding diagrams, Characteristics and applications of different types of DC Generators, emf built up process in DC Shunt Generator and causes of failure, Armature reaction-Demagnetizing and Cross magnetizing mmfs and their estimations (excluding numerical); Remedies to overcome the armature reaction; Commutation Process, Straight line commutation, Commutation with variable current density, under and over commutation, Causes of bad commutation and remedies; inter poles, Compensating windings

Unit 2: D.C. Motors: (10 Hrs)

Principles of working, Significance of Back EMF, Torque Equation, Types, losses and Efficiency, Condition for Maximum Efficiency, Characteristics and Selection of DC Motors for various applications, Starting of DC Motors (2-point, 3-point, 4point starters), Speed Control of DC Shunt and Series Motors, Braking of DC Motors (excluding numerical) - Plugging, Dynamic Braking, Regenerative Braking, Effect of saturation and armature reaction on losses

Unit 3: Testing of DC Machines: **(06Hrs)**

Direct and indirect methods of testing, brake test, Swinburne's test, Hopkinson's test, retardation test, comparison of methods

SECTION II

Unit 4: Single Phase Transformer: **(13 Hrs)**

Review of Transformer construction, types and practical consideration;, transformer on no-load and on-load condition with phasor diagrams, Transformer reactances and equivalent circuits, effect of load on power factor, Testing-Polarity test, Open Circuit Test (O.C.), Short Circuit Test (S.C.), Sumpner's Test, Regulation of transformers, percentage resistance and reactance, All day Efficiency, parallel operation, Auto- Transformer

Unit 5: Three Phase Transformers: **(13 Hrs)**

Special constructional features, three phase transformer connections, Labeling of transformer terminals, Star/Star connection, Delta/Delta Connection, Star/Delta, Delta/Star connection, Delta/Zigzag Star, Star/Zigzag Star, Vector groups, Choice of transformers connections, magnetizing inrush current, Parallel operation of transformers, Three winding transformers and its equivalent circuits, Open Delta connection, Three/Two phase conversion (Scott connection), On-Off Load Tap changing transformers

Text Books:

1. I J Nagrath, D P Kothari; "Electric Machines," Tata McGraw Hill Publication. Third Edition.
2. S K Bhattacharya, "Electrical Machines" Tata McGraw Hill Publication. Third Edition.
3. J B Gupta, "Theory and Performance of Electrical Machines" S K Kataria & Sons.
4. B L Theraja "A Text Book of Electrical Technology Vol. 2" S Chand.

Reference Books:

1. A.E.Fitzgerald, C.Kingsley, S.D.Umans. "Electrical Machinery" Tata McGraw Hill Sixth Edition 2002
2. P S Bhimbhra, " Electrical Machinery" Khanna Publishers
3. Ashfaq Hussain " Electrical Machines" Dhanpat Rai & Sons

Term work:

Minimum **eight** of the following list of experiments should be performed in the laboratory:

1. Determination of magnetization, external and internal characteristics of D.C. Generator.
2. Determination of efficiency and voltage regulation of DC Shunt generator by direct loading.
3. Speed control of D. C. Shunt motor by Armature and Field control.
4. Determination of efficiency and speed regulation of DC Shunt motor by direct loading.
5. Determination of efficiency and speed regulation of DC Shunt motor by indirect loading.
6. Determination of efficiency of a DC series motor by load test.
7. Determination of efficiency of a D.C. machine by performing Swinburne's test.
8. Determination of efficiency of a D.C. machine by performing Hopkinson's test.
9. Determination of efficiency of a D.C. machine by performing retardation test
10. Determination of efficiency of single phase transformer by Back to Back test.
11. Parallel operation of Single phase transformer.
12. Sumpner's test on two identical single phase transformers
13. Determination of equivalent circuit parameters of single phase transformer.
14. Scott connection of three phase transformers.
15. Direct load test on three phase transformer for various connections

Solapur University, Solapur

S.E Electrical Semester-I

ELECTRONIC DEVICES & CIRCUITS

Teaching Scheme	**Examination Scheme**
Theory: - 4 Hrs/Week	**Theory -** 100 Marks
Practical: - 2 Hrs/Week	**Term-Work -** 25Marks

Course Objectives

1) To develop conceptual & analytical understanding of BJT, its frequency response and modeling
2) To learn characteristics and operation of Field effect transistors along with their types.
3) To study Power amplifiers, feedback amplifiers, oscillators.
4) To study design procedures for unregulated power supplies.

Course Outcome

1) Students will be able to design transistorized circuits based on their conceptual understanding and analytical understanding of BJT.
2) Students will be able to analyze and operate FET circuits.
3) Students will be able to design unregulated power supplies for practical applications.
4) Students will be able to put oscillator circuits in to various operations.

SECTION I

Unit 1 Bipolar Junction Transistor: (09 Hrs)

Biasing circuits -DC circuit analysis, load line, thermal runaway, stability factor analysis, Biasing circuits (fixed, collector to base, self bias), compensation techniques

BJT as an amplifier, a. c & d. c equivalent circuit of CE amplifier

Cascade amplifier: Types of couplings, effect of couplings on performance of BJT amplifier, cascade connection, Darlington pair

Unit 2 Frequency response of BJT amplifier: (05 Hrs)

Low & high frequency response of CE amplifier, effect of Ce, Cc & Cj on frequency response of RC coupled CE amplifier

Design of driver circuits: design of single stage RC coupled BJT amplifier

Unit 3 Hybrid Model of BJT: (06 Hrs)

h-parameter of linear circuit, determination & meaning of h11, h12, h21 & h22, hybrid equivalent circuit of CE,CB,CC, determination of amplifier parameter(Av, Ai ,Ro, Ri), determination of h-parameters from input & output characteristics

Unit 4 Field Effect Transistor: (06 Hrs)

JFET construction, JFET characteristics, small signal JFET parameters, DC biasing of JFET, common source JFET amplifier, common drain amplifier, MOSFET-construction & characteristics of depletion type & Enhancement type

SECTION II

Unit 5 Design of Unregulated power supply: (06 Hrs)

Various types of filters C, L, LC & π, derivation of ripple factor of C & L type filter, design of unregulated power supply

Unit 6 Feedback amplifier: (10 Hrs)

Introduction to positive & negative feedback, types of negative feedback (current series, current shunt, voltage series & voltage shunt), its effect on input impedance, output impedance, voltage gain, current gain & bandwidth

Unit 7 Power Amplifier: (04 Hrs)

Classification of large signal amplifiers, circuit operation, waveforms, derivation of efficiency for class A, class B, class AB amplifier, crossover distortion in power amplifier

Unit 8 Oscillators: (06 Hrs)

Basic principles of oscillator, positive feedback, Barkhausen's criteria

Sinusoidal oscillators: Derive the expression for frequency of oscillation & condition of sustained oscillations for RC oscillators & LC Oscillators-(Hartley, colpitts & crystal oscillators)

Non-sinusoidal oscillators: Construction & characteristics of UJT, UJT relaxation oscillator, derivation of frequency of oscillation

Text Books:

1. B.L.Theraja & A.K.Theraja , "Electrical Technology Volume IV", S.Chand Publication
2. R.S.Sedha, "Applied Electronics", S.Chand Publication

Reference Books:

1. Allen Mottershead , "Electronic Devices and Circuits", PHI Publication
2. Boylestad , "Electronic Devices & Circuit Theory", Pearson Education
3. Floyd, "Electronic Devices", Pearson Education

Term work:

Minimum **eight** of the following list of experiments should be performed in the laboratory:

1. To study single stage RC coupled BJT CE amplifier circuit and its performance.
2. To study two stages RC coupled BJT amplifier circuit and its performance.
3. To study frequency response of single stage RC coupled BJT CE amplifier.
4. To study JFET characteristics & its coefficients.
5. To study MOSFET characteristics & its coefficients.
6. To study feedback amplifiers and find out gain with & without feedback.
7. To study frequency response of feedback amplifiers.
8. To study RC phase shift Oscillator.
9. To study Wein Bridge Oscillator.
10. To study UJT Relaxation Oscillator.
11. To study power amplifier.
12. To study unregulated power supply.

*****

Solapur University, Solapur

S.E Electrical Semester-I

ELECTRICAL MEASUREMENT & INSTRUMENTATION

Teaching Scheme	**Examination Scheme**
Theory: - 4 Hrs/Week	**Theory -** 100 Marks
Practical: - 2 Hrs/Week	**Term Work -** 25 Marks
	POE - 50 Marks

Course Objectives

1) To impart in depth knowledge of the operating principle, construction, mechanisms used in measuring instruments used for the measurement of electrical quantities.
2) To introduce the concept of accuracy and precision in the measurement of electrical quantities.
3) To make the students capable of selecting the proper instrument for the measurement

Course Outcome

1) The students will be able to use Analog instruments in practical applications.
2) The students will be able to apply potentiometer & bridges for measurements of resistance, inductance & capacitance.
3) The students will be able to understand the applications of instrument transformer and data acquisition system for sensing & control of electrical quantities.
4) The students will be able to use digital instruments for various measurements.

SECTION-I

Unit -1 Basic Concept of Measurement (04 Hrs)

Standards & their classification, types of errors, characteristics of measuring instruments static & dynamic, accuracy, linearity, speed of response, dead zone, repeatability, resolution, span, reproducibility, drifts, need for calibration

Unit -2 Analog Instruments (12 Hrs)

a) Classification of instrument- absolute & secondary, types of secondary instrument- indicating, recording, analog, digital, Essentials of indicating instrument; PMMC, PMMI, Electrodynamometer instrument- operating principle, torque equation, errors, shape of scale, measurement of ac/dc current, voltage and power; measurement of power using two wattmeter method for balanced & un balanced load, shunt & multiplier Ohmmeter, Megger, Earth tester

b) 1-Φ & 3-Φ Electro dynamo meter & moving iron type power factor meter, Weston type frequency meter, Synchroscope, Maximum demand indicator

Unit- 3 Potentiometer & Bridges (10 Hrs)

a) Principle of DC potentiometer, Crompton's type DC Potentiometer; Applications of DC Potentiometer, principle of AC potentiometer & its applications

b) DC bridges-Wheatstone's, Kelvin's double bridge for measurement of resistance; AC bridges-Maxwell's, Hey's, Anderson's bridges for inductance measurement, Desauty, Schering bridges for capacitance measurement (numerical based on bridges)

SECTION II

Unit -4 Instrument Transformers (08 Hrs)

Construction and theory of instrument transformers (CT & PT), equations for ratio and phase angle error(derivations), turns compensation, numerical based on CT and PT ratio

Unit – 5 Digital Instruments (08 Hrs)

Digital voltmeter, types of digital voltmeter, digital multi-meter, electronic counter, digital measurement of frequency & time period, Q- meter, Electronic energy meter

Unit-6 Data acquisition System (05 Hrs)

Types of data acquisition system, multiplexing & its types, Strip chart recorder, X-Y recorder

Unit – 7 Oscilloscopes (05 Hrs)

Introduction, block diagram of CRO & working of each block, CRT features, Basics of digital storage oscilloscope, use of DSO for voltage, current, phase, frequency & time measurement

Text Books

1) H.S Kalsi, "Electronics instrumentations", Tata McGrew Hill, 3rd Edition.
2) A.K Sawhney "Electrical & Electronics Measurements", Dhanpat Rai & Sons 9th Edition
3) R.K.Rajput, "Electrical Measurements & Measuring Instruments", S chand, 2010 Edition
4) Rangan, Mani, Sharma, "Instrument Devices & Systems", Tata McGrew Hill, 2nd Edition

Reference Book

1) John P. Beately, "Principles of measurement system", 3rd Edition, Pearson Education 2000
2) Cooper D & A D Helfrick, "Modern electronic instrumentation & measuring techniques", PHI, 2009 Edition
3) David A. Bell, "Electronic Instrumentation & Measurement", oxford Publication, 2nd Edition 2009
4) Golding & Widdies, "Electrical Measurement & Measuring Instruments", Pitman

Term work:

Minimum **eight** of the following list of experiments should be performed in the laboratory:

1) Measurement of low resistance by using Kelvin's double bridge
2) Measurement of high resistance by using Whetstone's bridge.
3) Measurement of inductance by using Maxwell's bridge
4) Measurement of capacitance by using Schering Bridge.
5) Measurement of power in 3-ph circuit by 2-wattmeter method for balanced & unbalanced load.
6) C T & P T testing
7) To measure the insulation resistance by Megger.
8) To measure the power factor of single phase load by PF meter and verifying through current, voltage & power measurement.
9) Measurement of unknown voltage & resistance by DC potentiometer.
10) Measurement of temperature by using any one of RTD, Thermistor & Thermocouple.
11) Use of resistance strain gauge for measurement of weight.
12) LVDT transducer for measurement of displacement.
13) Measurement of Q-factor by Q-meter.

Solapur University, Solapur

S.E. Electrical Semester-I

POWER PLANT ENGINEERING

Teaching Scheme	**Examination Scheme**
Theory: - 3 Hrs/Week	**Theory -** 100 Marks
Tutorial: - 1 Hr/Week	**Term Work - 25** Marks

Course Objectives

1) To develop conceptual & analytical understanding of operation of different power plants
2) To learn economic aspects of different power plants
3) To study necessity and types of non conventional energy sources

Course Outcome

1) Students will be able to analyze different types of power plants considering technical, environmental & economic aspects.
2) Students will be able to select the type of power plant for a site considering technical, environmental & economic aspects.
3) Students will be able to investigate need and areas of application for non conventional energy sources.

SECTION I

Unit 1 Introduction: (04 Hrs)

Power to progress, Different types of conventional energy sources, types of non conventional energy sources, Structure of power industry

Unit 2 Economic Aspects of Power Generation: (08 Hrs)

Introduction, terms commonly used in syste

m operations, variable load on power station, peak load, base load, diversity factor, plant utility factor, maximum demand, load curves, load duration curves, types of loads, selection of generation units, interconnected grid systems, cost of electrical energy, Tariff & different types of tariff (including Numericals)

Unit 3 Hydro Power Plants: (06 Hrs)

Introduction (advantages & disadvantages), typical layout of power plant, site selection, classification of hydro plants, stream flow, hydrograph, flow duration curves, hydrology, types of turbines (pelton wheel turbine, Francis and Kaplan turbines), economics of small hydro schemes, relation of power generation with water head

Unit 4 Thermal Power Plants: (06 Hrs)

Introduction (advantages & disadvantages), typical layout of power plant, site selection, fuels & their handling, combustion process (fluidised bed combustion), ash handling, dust collection, Prospects and development of thermal plants in India, Environmental Aspects

SECTION II

Unit 5 Diesel & Gas Turbine Power Plants: (10 Hrs)

Diesel Plants: Introduction (advantages & disadvantages), typical layout of power plant, site selection, applications

Gas Turbine Plants: Introduction (advantages & disadvantages), typical layout of power plant, site selection, gas fuels, gas turbine materials, open loop & closed loop power plants

Unit 6 Nuclear Power Plant: (08 Hrs)

Introduction (advantages & disadvantages), typical layout of power plant, site selection, nuclear reaction, materials, radioactive decay, half life, classification of nuclear reactor (AGR,PWR,BWR), nuclear waste disposal, Environmental Aspects

Unit 7 Non conventional Energy Sources: (06 Hrs)

Solar Energy: Introduction (advantages & disadvantages), typical layout of solar thermal power plant, site selection, solar thermal receiver system (introduction)

Wind Energy: Introduction (advantages & disadvantages), typical layout of wind power plant, site selection, wind turbine operation

Introduction to Geothermal energy, MHD, BIOMASS & tidal energy

Term work:

Term work consists of minimum six assignments. It is desirable to visit to generating power plant.

Text Books:

1. P. K. Nag, "*Power Plant engineering",* Tata MC Graw Hill.
2. B. R. Gupta, "*Generation of Electrical Energy"*, S Chand Publication.

3. R. K. Rajput, "*Power System Engineering"*, Laxmi Publications.

Reference Books:

1. M.M.EI-Wakil, " *Power Plant Technology"*, Tata Mc Graw Hill
2. J. B. Gupta, *"A course in Electrical Power"*, S. K. Kataria & Sons

****

Solapur University, Solapur

S.E. Electrical Semester-I

MATLAB PROGRAMMING

Teaching Scheme	**Examination Scheme**
Theory: - 1 Hr/week	
Practical: - 2 Hrs/Week	**Term-Work –** 25 Marks

Course Objectives

1) To understand basic representation of Matrices and vectors in MATLAB
2) To learn various programming structures in MATLAB
3) To study built in and user defined functions in MATLAB
4) To become conversant with 2D as well as 3D graphics in MATLAB

Course Outcome

1) Students will develop conceptual & analytical understanding of MATLAB Programming
2) Analyze & script the MATLAB programs for different engineering applications.

SECTION I

Unit 1: Introduction to MATLAB basics **(01 Hr)**

The MATLAB environment, Input-output, File types, Platform dependence, General commands, creating a script file in MATLAB

Unit 2: Matrices & vectors: **(03 hrs)**

Entering Matrix, indexing matrix, matrix manipulation, creating vectors, Matrix and array operations such as arithmetic operators, relational operators, logical operators, Elementary math functions

Unit 3: Programming Structure in MATLAB **(02 Hrs)**

For loops, while loops, if-else if-else statements, switch–case-otherwise statements, Understanding use of Break, return, end and continue, nesting loops

SECTION II

Unit 4: Functions in MATLAB **(02 hrs)**

Built in functions & User defined functions in MATLAB, examples of built in functions, creating a user defined function, executing a user defined function, concept of sub function & nested functions

Unit 5: Graphics **(02 hrs)**

Basic 2D plots: labels, title, legend, text objects, axis control, overlay plots, modifying plots with plot editor, subplots

Introduction to 3D plots: Concepts of mesh & surface plots

Unit 6: Applications of MATLAB **(02 hrs)**

Solving Simultaneous equations, curve fitting & Interpolation, Integration & Ordinary differential equations

Reference books

1. Stephan J Chapman, 'MATLAB Programming for Engineers', Thomson Publication.
2. Shailendra Jain,'Modeling & Simulation Using MATLAB Simulink', Wiley Publication
3. Rudra Pratap 'Getting started with MATLAB', Pub Oxford University press
4. Duane Hanselman & Bruce Little field 'Mastering MATLAB', Pearson Education 2005
5. Brain R. Hunt, Ronald L. Lipsman & Jonathan M. Rosenberg 'A guide to MATLAB' Cambridge University Press 2002
6. O.Beucher & M.Weeks ' Introduction to MATLAB & SIMULINK A project approach' , Infinity Science press Firewall Media.

Term work:

Term work consists of minimum 10 MATLAB Programs covering above syllabus.

****

DETAILED SYLLABUS

FOR

S.E. ELECTRICAL ENGINEERING

PART - II

W.e.f Academic Year 2013-14

Solapur University, Solapur

S.E Electrical Semester-II

NUMERICAL METHODS AND COMPUTER PROGRAMMING

Teaching Scheme	**Examination Scheme**
Theory: - 3 Hrs/Week	**Theory-** 100 Marks
Practical: - 2 Hrs/Week	**Term Work -** 25 Marks

Course Objectives

1. To understand numerical methods and their application to Electrical Engineering.
2. To apply the knowledge of these methods to solve practical problems with C Programming.

Course Outcome

1. Ability to identify and to classify the numerical problem to be solved
2. Ability to choose the most appropriate numerical method for its solution based on characteristics of the problem
3. Ability to program Numerical Methods

SECTION-I

Unit- 1: Solution of equation for engineering design and analysis and numerical research for roots of algebraic and transcendental equations: (10 Hrs)

Introduction, Taylor's series expansion of function, floating point and fixed point, algorithms and flow charts, error considerations, Bisection method, method of false position, Newton-Raphson method, Secant method, Complex roots of equation, practical application, development of C programs for the above mentioned methods

Unit -2: Methods to solve linear simultaneous equations: (06 Hrs)

Properties of matrices, Gaussian elimination, pivoting techniques, Gauss-Jordan method, matrix factorization techniques, Jacobin method, Gauss-Seidal method, development of C programs for the above mentioned methods

Unit-3 Function approximation or interpolation: (08 Hrs)

Least square approximation, least square function approximation, interpolation with divided difference, Lagrange's polynomials, and cubic spline approximation, development of C programs for the above mentioned techniques

SECTION II

Unit- 4 Numerical Integration and Differentiation: (08 Hrs)

Introduction, Trapezoidal rule, Simpson's $1/3^{rd}$ rule, Simpson's $3/8^{th}$ rule, Newton-Cote's formulae, Romberg integration, Central difference, Backward Difference, Error consideration, development of C programs for the above mentioned methods

Unit-5 Matrix Eigen value problems and solution of equations: (08 Hrs)

Gerschgorin circle theorem, characteristics equation, power method, inverse power method, Jacobin's method, development of C programs for the above mentioned methods

Unit- 6 Numerical solution of ordinary differential equation and introduction to Partial differential equation: (08 Hrs)

Introduction, Runge Kutta method, Euler's method, elliptic partial differential equation, parabolic partial differential equation, Hyperbolic partial differential equation, development of C programs for the above mentioned methods

Instructions:

- Minimum six Assignments based on above mentioned syllabus. The students are expected to solve the given problem by using the appropriate program given to them by C programming in practical batch.
- The theory paper shall contain only the numerical based on syllabus. No computer program should be asked in the theory examination.

Text Books:

1) S.S. Sastry, "Introductory Methods of Numerical Analysis", PHI Learning Publication
2) B.S. Grewal, "Numerical Methods", Khanna Publications, Delhi.
3) E Balagurusamy, "Numerical Methods", Tata McGraw-Hill Education.
4) P. Kandasamy, K Thilagavathy and K Gunavathi, "Numerical Methods", S Chand Publications.

Reference Books:

1) M. K. Jain, S. R. K. Iyengar, R. K. Jain, "Numerical Methods for scientific and engineering Computations", New Age International Ltd.
2) Rama. B. Bhat, S. Chakraverty, "Numerical analysis in Engineering", Narosa Publications.
3) Robert J. Schilling, Sandra L. Harris, "Applied Numerical Methods for Engineers (using MATLAB and C)", Cengage Publications.

Solapur University, Solapur

S.E Electrical Semester-II

ELECTRICAL MACHINES-II

Teaching Scheme	**Examination Scheme**
Theory: - 4 Hrs/Week	**Theory** - 100 Marks
Practical: - 2Hrs/Week	**Term Work - 25** Marks
	POE- 50 Marks

Course Objectives

1) To know construction and operating principles of three induction motors.
2) To get detailed acquaintance of construction, operating principles of three phase induction motors.
3) To find equivalent circuit parameters and performance parameters for single as well as three phase induction motors.

Course Outcome

1) Students will be able to analyze performance of three phase as well as single phase induction motors.
2) Students will be able to identify applications of induction motors in industries & power sector.

SECTION I

Unit- 1 Introduction to three phase Induction Motor: (10 Hrs)

Construction, types of I.M, production of rotating magnetic field, principle of operation, concept of slip, rotor induced E.M.F, & current, rotor frequency , equivalent circuit of rotor under running condition, losses & efficiency, speed regulation, power flow diagram (including numerical), torque equation, maximum torque, condition for maximum torque, starting torque, full load torque, and their ratios (including numerical)

Unit- 2 Characteristics of three phase Induction Motor: (10 Hrs)

Torque slip characteristics**,** effect of variation of rotor resistance on torque slip characteristic, application of slip ring & sq. cage induction motor, crawling & cogging effects, double cage Induction motor & its Equivalent circuit (including numerical)

Unit -3 Starting of three phase Induction Motor: (06 Hrs)

Necessity of starters, types of starters (DOL, Star Delta, Auto Transformer & Rotor Resistance), (including numerical)

SECTION-II

Unit -4 Speed control of three phase Induction Motor: (08 Hrs)

Stator side speed control methods (applied voltage, frequency, pole changing), rotor side speed control methods (rotor resistance, cascade connection, E.M.F injection, slip power recovery)

UNIT 5 Performance of 3 phase Induction Motor: (10 Hrs)

Effect of load on stator power factor, No load & Blocked rotor test, construction equivalent circuit & circle diagram, (including numerical), determination of all performance parameters from Circle diagram, operation of Induction Machine as an Induction Generator

Unit- 6 Single phase Induction Motors: (08 Hrs)

Principle of operation, concept of double field revolving theory & cross field theory, types of 1ph of I.M based on method of self starting and their T-slip characteristics, equivalent circuit, determination of equivalent circuit parameters using OC & SC Tests, (numerical based on equivalent circuit)

Text Books:

1) I J Nagrath, D P Kothari, "Electric Machines," Tata McGraw Hill Publication. Third Edition.
2) S K Bhattacharya, "Electrical Machines" Tata McGraw Hill Publication. Third Edition.
3) J B Gupta, "Theory and Performance of Electrical Machines" S K Kataria & Sons.
4) B L Theraja, "A Text Book of Electrical Technology Vol. 2" S Chand.

Reference Books:

1) A.E.Fitzgerald, C.Kingsley, S.D.Umans, "Electrical Machinery", Tata McGraw Hill. Sixth Edition 2002.
2) P S Bhimbhra, " Electrical Machinery" Khanna Publishers.
3) Ashfaq Hussain ," Electrical Machines" Dhanpat Rai & Sons

Term work:

Minimum eight of the following list of experiments should be performed in the laboratory:

1. Determination of efficiency & speed regulation of 3 phase Sq. cage induction motor (SCIM) by direct loading method
2. Determination of efficiency & speed regulation of 3 phase SCIM by indirect loading method
3. Determination of equivalent circuit parameters of 3 Ph SCIM by conducting No Load & Blocked Rotor Test.
4. Determination of efficiency & speed regulation of 3 phase slip ring induction motor by direct loading method.
5. Determination of efficiency & speed regulation of 3 phase slip ring induction motor by indirect loading method.
6. Study of starters for 3 Ph induction motors.
7. Performance of three phase induction motor under single phasing fault.
8. Speed control methods of 3 Ph. SCIM.
9. Speed control methods of 3 Ph. Slip ring I.M
10. Determination of efficiency & speed regulation of 1 phases induction motor.

*****

Solapur University, Solapur

S.E Electrical Semester-II

ELEMENTS OF POWER SYSTEMS

Teaching Scheme
Theory: - 4 Hrs/Week
Tutorial: - 1 Hr/Week

Examination Scheme
Theory - 100 Marks
Term-Work - 25 Marks
OE - 25 Marks

Course Objectives

1. To learn basic structure of power systems and mechanical design of overhead lines.
2. To study various effects related to overhead transmission lines.
3. To gain knowledge about need of power transmission using underground cables, types of underground cables
4. To understand DC & AC distribution systems and substations.

Course Outcome

1. Students will be able to understand overall structure of power system.
2. Students will be able to understand mechanical design of transmission lines.
3. Students will be able to implement the knowledge to design underground power distribution system..
4. Students will be able to analyze various performance parameters of transmission lines.

SECTION -I

Unit- 1 General structure of power system: **(08 Hrs)**

Introduction, Electrical supply system, typical A.C power supply scheme, Comparison D.C and A.C systems, comparison between overhead and underground system, comparison of conductor cost for various AC transmission systems, Economics of power transmission- Economic choice of conductor size (kelvins law), numericals on kelvins law, Economic choice of AC transmission voltage

Unit- 2 Mechanical design of overhead lines: **(06 Hrs)**

Introduction, main components, conductor materials, line supports, over head line insulators, types- pin type, suspension type, strain type insulators, string efficiency, numericals on string efficiency, methods of improving string efficiency

Unit -3 Corona & sag in overhead lines: **(06 Hrs)**

Corona-principle, terms- definitions and empirical formulae related corona, factor affecting corona, advantages and disadvantages of corona, methods of reducing corona effect.
Sag in overhead lines, calculation of sag, numerical based on sag and corona, stringing charts (Tension and sag relation)

Unit- 4 Underground cables: **(06 Hrs)**

General construction of cables, insulating materials for cables, classification of cables, insulation resistance of a single core cable, capacitance of a single core cable, dielectric stress in a single core cable, grading of cables, and capacitance of 3-phase cables, numerical based on grading & capacitance

SECTION- II

Unit -5 Constants of transmission lines: **(08 Hrs)**

Resistance of line, skin effect and proximity effect, inductance of single phase 2 wire line, G.M.R and G.M.D., inductance of three phase line with equilateral spacing, unsymmetrical spacing, effect of transposition, line capacitance, capacitance of 1ph and 3ph line, effect of earth on the capacitance of overhead lines

Unit- 6 Performance of transmission lines: **(08 Hrs)**

Introduction, classification of overhead transmission lines, important terms, performance of short transmission line, effect of load P.F on regulation and efficiency, medium transmission lines-end condenser method, nominal T method, nominal π method, long transmission lines-rigorous solution, generalized circuit constants of a transmission line, Ferranti effect, derivations of generalized constants (A,B,C,D) of short, medium & long transmission lines, causes of low power factor & benefits of power factor improvement

Unit- 7 Distribution systems: **(06 Hrs)**

Classification & types, connection schemes of distribution systems, D.C distribution calculations-D.C distributor fed at one end and both ends with concentrated and uniform load, Ring main distributor
AC distribution and its calculations, 3phase 3wire and 3 phase 4 wire connected loads. Numerical based on DC and AC distribution

Unit- 8 Substations and Grounding **(04 Hrs)**

Substations: classification, symbols for equipment in substations, equipments in substation

Grounding: Introduction, Grounding of transformer neutral, resistance grounding, reactance grounding, solid grounding

Text Books:

1) J.B.Gupta, "A course in Electrical power" S K Kataria and sons
2) V. K. Mehta, Rohit Mehta, " Principles of power system", S. Chand Publication

Reference Books:

1) M. L. Soni, P. V. Gupta, U. S. Bhatnagar, "Power system engineering" by Dhanpat Rai and sons
2) C. L. Wadhwa , "Electrical power system", New age international
3) S.M. singh, "Electrical power generation transmission and distribution", PHI New Delhi
4) M.V .Deshpande, "Elements of power system design", A.H wheeler and Co.

Term work:

1) Minimum 4 drawing sheets based on the above syllabus
2) One substation visit related to syllabus and report based on it.
3) Two assignments based on syllabus.

****

Solapur University, Solapur

S.E. Electrical Semester-I

ANALOG & DIGITAL INTEGRATED CIRCUITS

Teaching Scheme	**Examination Scheme**
Theory: - 4 Hrs/Week	**Theory-** 100 Marks
Practical: - 2 Hrs/Week	**Term-Work-** 25 Marks

Course Objectives

5) To understand basic operation and terminology related to operational amplifier.
6) To learn various open loop as well as closed loop circuit configurations of operational amplifier.
7) To study fundamentals of logic families and combinational as well as sequential logic circuits.

Course Outcome

1) Students will be able to apply open loop and closed loop circuit configurations of an operational amplifier in different control circuit designs.
2) Students will be able to use principles of combinational circuits in practical applications.
3) Students will be able to use principles of sequential circuits in practical applications.

SECTION- I

Unit- 1 Introduction of Differential Amplifier: (04 Hrs)

Introduction of Differential amplifier & its types: D.C. & A.C. analysis of dual input balanced output, dual input unbalanced output, single input balanced output, single input unbalanced output

Unit- 2 Operational Amplifier: (04 Hrs)

Block diagram of typical op-amp, Ideal characteristics of op-amp & practical characteristics of op-amp (IC741): input offset voltage, input offset current, input bias current, differential input resistance, offset voltage adjustment range, input voltage range, common mode rejection ratio, supply voltage rejection ratio, large signal voltage gain, output voltage swing, output resistance, slew rate, gain bandwidth product; Equivalent circuit of op-amp, ideal voltage transfer curve

Unit- 3 closed loop & open loop configurations of Operational Amplifier: (08 Hrs)

Open loop configurations of op-amp (differential, inverting & non inverting), block diagram of closed loop configurations of op-amp: voltage series, voltage shunt, current series, current shunt feedback. Derivation of various parameters for voltage series & voltage shunt feedback op-amp (closed loop voltage gain, input resistance with feedback, output resistance with feedback, bandwidth with feedback, total output offset voltage with feedback), concept of virtual ground condition

Unit -4 Applications of op-amp: (10 Hrs)

Voltage follower, current to voltage converter, voltage to current converter with floating & grounded load, adder circuit (by using inverting, non inverting & differential configuration of op-amp), subtractor (by using differential configuration of op-amp), instrumentation amplifier, integrator & differentiator

SECTION II

Unit- 5 Introduction to Logic Families: (03 Hrs)

TTL & CMOS logic families, their characteristics and comparison

Unit6 Combinational Logic Circuits: (09 Hrs)

Introduction, standard representation for logic functions (SOP and POS forms), Karnaugh map (K map) representation of logic functions up to 4 variables, simplifications of logic functions using K map, Minimization of logic functions specified in Minterm and Maxterm, Minimization of logic functions not specified in Minterm and Maxterm, Don't care conditions

Principle of Multiplexing and de multiplexing, Digital ICs for multiplexer and de multiplexer and their operation

Unit-7 Flip Flops: (06 Hrs)

Introduction, RS flipflop, JK flipflop, race around condition in JK flip flop, Master Slave JK flipflop, D & T flip flops, operation, truth table, characteristic equation, Level & Edge triggered flip flops

Unit- 8 Sequential Logic Circuits: (08 Hrs)

Registers: Introduction, shift register, types/modes of shift registers, bidirectional shift registers, universal shift registers, applications of shift registers (Ring counter, twisted ring counter, sequence generator)

Counters:

Asynchronous counter: Asynchronous or ripple counter using flip flops and IC 7490, up/down/up-down Asynchronous counters, modulus of counter, limitations of Asynchronous counters

Synchronous counter: Synchronous counter using T, D, JK flip flops and IC 74191, up/down/up-down synchronous counters, modulus of counter

Text books:

1) Gayakwad Ramakant A, OP _AMP' sand Linear IC's, Prentice Hall of India
2) Jain R.P., "Modern Digitals Electronic "Tata McGraw Hill, 1984.
3) Morris M. Mano. "Digital design", Prentice Hall International – 1984.

Reference books:

1) Malvino & Leach, "Digital principal and Application" , Tata McGraw Hill, 1991.
2) Bignell James& Donovan Robert "Digital electronic" Delmar, Thomas Learning, 2001.

Term work:

Minimum eight from the following list of experiments should be performed in the laboratory.

1. Application of op-amp as Inverting & non inverting amplifier
2. Application of op-amp as Adder & subtractor circuit
3. Application of op-amp as Integrator circuit
4. Application of op-amp as Differentiator circuit
5. Application of op-amp as Voltage follower circuit
6. Application of op-amp as Voltage to current and current to voltage converter circuits
7. Design of circuit using Multiplexer and De multiplexer
8. Study of S-R, J-K flip flops
9. Study of T and D flip-flops.
10. Design of Synchronous counter using flip-flop
11. Design of Asynchronous counter using flip- flop and counter

Solapur University, Solapur

S.E Electrical Semester-II

NETWORK ANALYSIS

Teaching Scheme	**Examination Scheme**
Theory: - 4 Hrs/Week	**Theory -** 100 Marks
Practical: - 2 Hrs/Week	**Term Work –** 25 Marks
	OE - 25 Marks

Course Objectives

1) To understand network simplification & analysis using Mesh and Nodal techniques.
2) To study network theorems & network topology
3) To gain knowledge of transient behaviour of networks
4) To learn various parameters of two port networks.

Course Outcome

1) Students will be able to simplify the complex electrical networks by applying various theorems.
2) Students will be able to analyze electrical networks by using Mesh and Nodal techniques.
3) Students will be able to analyze transient behaviour of electrical networks in time domain as well as in 's' domain.
4) Students will be able to determine various parameters of two port networks.

SECTION -I

Unit -1 Basic Concepts: **(10 Hrs)**

Practical sources, Source transformations, Network reduction using Star – Delta transformation, Loop and node analysis With linearly dependent and independent sources for DC and AC networks, Concepts of super node and super mesh

Unit -2 Network Theorems: **(10 Hrs)**

Superposition, Reciprocity and Millman's theorem, Thevenin's and Norton's theorems; Maximum Power transfer theorem

Unit -3 Network Topology: **(06 Hrs)**

Graph of a network, Concept of tree and co-tree, incidence matrix, tie-set, tie-set and cut-set schedules, Formulation of equilibrium equations in matrix form, Solution of resistive networks, Principle of duality

SECTION-II

Unit- 4 Transient behavior: **(09 Hrs)**

Behavior of circuit elements under switching condition and their Representation, evaluation of initial and final conditions in RL, RC and RLC circuits by DC Supply

Unit -5 Laplace Transform & its Applications: **(09 Hrs)**

Laplace transform of some important function (step, ramp, impulse, sin, cosine, exponential etc.), the transformed circuit (R, L, C), analysis of RL, RC & RLC circuits using Laplace transform

Unit -6 Two port networks: **(08 Hrs)**

Determination of z, y, h and transmission parameters, relationship between parameters sets, inter connection of two port network

Text Books:

1. Ravish Singh, "Electrical Networks" Tata McGraw Hill Publication.
2. M. E. Van Valkenburg, "Network Analysis", PHI / Pearson Education, 3rd Edition. Reprint 2002.
3. Roy Choudhury, "Networks and systems", New Age International Publications.

Reference Books:

1. Hayt, "Engineering Circuit Analysis", Kemmerly and DurbinTMH 6th Edition, 2002
2. Franklin F. Kuo, "Network analysis and Synthesis", Wiley International Edition,
3. David K. Cheng, "Analysis of Linear Systems", Narosa Publishing House, 11th reprint, 2002.
4. Bruce Carlson, "Circuits", Thomson Learning, 2000. Reprint 2002

Term work:

Minimum eight of the following list of experiments should be performed in the laboratory:

1. Verification of Mesh analysis technique.
2. Verification of Nodal analysis technique.
3. Verification of Thevenin's theorem.
4. Verification of Norton's theorem.
5. Verification of Reciprocity theorem.
6. Verification of Maximum Power transfer theorem.
7. Determination of Z parameters of two port network.
8. Determination of Y parameters of two port network.
9. Determination of h parameters of two port network.
10. Verification of transient behavior of RL circuit by using any circuit simulation software.
11. Verification of transient behavior of RC circuit by using any circuit simulation software.
12. Verification of transient behavior of RLC circuit by using any circuit simulation software.

*****

Solapur University, Solapur

S.E Electrical Semester-II

SIMULATION ELECTRICAL CIRCUITS BY MATLAB

Teaching Scheme
Practical: - 2 Hrs/Week

Examination Scheme
Term-Work- 25Marks

Course Objectives

1) To develop conceptual & analytical understanding of MATLAB SIMULINK
2) To develop design skills so that students become able to model a program in SIMULINK for different applications.

Course Outcome

Students will be able to build and analyze models in SIMULINK platform.

SECTION-I

Unit- 1 Introduction to simulation

Introduction to simulation, Importance of simulation in Electrical Engineering, Organization of Simulink, constructing a simulink block diagram, simulink simulation

Unit -2 Simulink toolbox

Introduction to various blockset in simulink toolbox: continuous blockset, discrete blockset , logic and bit operation blockset , lookup tables blockset , Math operation blockset , Model verification blockset, Port and subsystem blockset , signal attributes blockset, signal routing blockset, sinks blockset, sources blockset

SECTION –II

Unit- 3 Simpower toolbox

Study and understanding of every blockset of simpower Toolbox: electrical sources blockset , elements blockset ,Machines blockset , Measurement blockset , phasor elements blockset

Unit -4 Electrical applications

Creating a model file using Machine blockset of simpower and analyze the performance of DC shunt, series motor, induction motor and single phase motors

Term Work:
At least 10 model file should be created based on above topics

****