SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF ENGINEERING & TECHNOLOGY

ELECTRONICS ENGINEERING

Syllabus for

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

SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY
Electronics Engineering

Programme Educational Objectives and Outcomes

A. Program Educational Objectives

1. To enable student to achieve immediate employment in Electronics, Communication and IT related industries with appropriate title and compensation.
2. To enable student to analyze and solve Electronics Engineering problems by applying basic principles of mathematics, science, and engineering and also able to use modern engineering techniques, skills, and tools to fulfill societal needs.
3. To enable student to innovate, design and develop hardware and software components.
4. To nurture student to be sensitive to ethical, societal and environmental issues while conducting their professional work.
5. To build strong fundamental knowledge amongst student to pursue higher education and continue professional development in Electronics & other fields
6. To equip student with technical and communication skills in order to be able to function in national/international/multi-cultural corporations and organizations.

B. Program Outcomes

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 ENGINEERING & TECHNOLOGY
Electronics Engineering

Structure of S.E. (Electronics Engineering) w.e.f. from 2013-14

Semester-I

Sr. No.	Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	TH	TW	POE	OE	Total
1.	Engineering Mathematics – III	3	1	--	4	100	25	--	--	125
2.	Electronics Circuit Analysis and Design – I	4	--	2	6	100	25	*50	--	175
3.	Network Theory and Analysis	4	--	2	6	100	25	--	--	125
4.	Digital Logic Design	4	--	2	6	100	25	25	--	150
5.	Data Structures	3	--	2	5	100	25	50	--	175
6.	Electronic Workshop	--	1	2	3	--	50	--	--	50
	Total	**18**	**02**	**10**	**30**	**500**	**175**	**125**	**--**	**800**
7.	Environmental Science	1	--	--	1	--	--	--	--	--

Semester-II

Sr. No.	Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	TH	TW	POE	OE	Total
1.	Electrical Machines	3	--	2	5	100	25	--	25	150
2.	Electronics Circuit Analysis and Design – II	4	--	2	6	100	25	$50	--	175
3.	Analog Communication	3	--	2	5	100	25	--	--	125
4.	Linear Integrated Circuits	4	--	2	6	100	25	50	--	175
5.	Signals and Systems	4	1	--	5	100	25	--	--	125
6.	Software Simulation Tools	--	1	2	3	--	50	--	--	50
	Total	**18**	**02**	**10**	**30**	**500**	**175**	**100**	**25**	**800**
7.	Environmental Science	1	--	--	1	--	--	--	--	--

Note –

- * Network Theory and Analysis Practical and Oral Examination is combined with Electronics Circuit Analysis and Design – I
- $ Practical and Oral Examination of Electronics Circuit Analysis and Design – II includes some of the simulation practical from Software Simulation Tools
- 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
S.E. (Electronics) Semester-I
ENGINEERING MATHEMATICS-III

Teaching Scheme
Theory – 3 Hrs. /Week
Tutorial – 1 Hr. /Week

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

Course Objectives:

1. To introduce higher order linear differential equations related to electronics and electrical circuit problems
2. To introduce Laplace and inverse Laplace transforms and analyze electrical circuits using it
3. To introduce Fourier series and integral transform.
4. To introduce Z transform and its properties
5. To introduce vector calculus

Course Outcomes:

At the end of this course, the student will be able to-

1. Solve the higher order linear differential equation related to electrical circuit theory
2. Apply Laplace and inverse Laplace transforms for analysis of simple electrical circuits
3. Express the function in terms of sine and cosines components so as to model simple periodic functions
4. Exhibits knowledge of Z transform and its properties
5. Use different vector differential operators

SECTION I

Unit 1: Linear differential equations with constant coefficients: (6 Hrs.)

Basic definition, differential operator, complimentary functions, particular integral shortcut method for standard functions like $e^{ax}, \sin(ax+b), \cos(ax+b), x^m, e^{ax}V \text{ and } xV$; particular integral general method (without method of variation of parameters) for other functions, electrical engineering applications

Unit 2: First order partial differential equations: (5 Hrs.)

Non-linear partial differential equations of -

$type\ I\ f(p,q)=0, type\ II\ f(p,q,z)=0, type\ III\ f_1(p,x)=f_2(q,y)$; linear partial differential equations by Lagaranges method

Unit 3: Laplace transform: **(5 Hrs.)**

Definition, Laplace transform of standard functions, properties- first shifting, change of scalar, multiplication of power t and division by t, Laplace transform of derivative and integral, Laplace transform of periodic functions, unit step functions and unit impulse functions.

Unit 4: Inverse Laplace transform: **(5 Hrs.)**

Methods of finding inverse Laplace transforms, convolution theorem, applications to solve linear differential equations related to electrical circuits with constant coefficients

SECTION-II

Unit 5: Fourier series: **(6 Hrs.)**

Definition, Euler's formula, expansions of function, change of interval, even and odd functions, half range Fourier series.

Unit 6: Fourier transform: **(5 Hrs.)**

Fourier integral, Fourier sine and cosine integral, complex form of Fourier integral; Fourier transforms; Fourier sine and cosine transform and inverse transform

Unit 7: Z-transform: **(5 Hrs.)**

Z-transform of elementary functions, properties of Z-transform and inverse Z-transform

Unit 8: Vector calculus: **(5 Hrs.)**

Differentiation of vectors, vector differential operator, gradient, divergence and curl of vector field, solenoid, irrotational and conservative vector field

Term work:

- Minimum six to eight assignments based on above mentioned syllabus shall be completed

Text books:

1. A textbook of Applied Mathematics, J.N., P.N. Wartikar, Vidyarthi Grah Prakashan, Pune, Vol. II and Vol. III.
2. Higher Engineering Mathematics, B.S.Grewal, Khanna Publications, Delhi.
3. A textbook of Applied Mathematics, N.P. Bali, Ashok Saxena, N.Ch.S.N. Iyengar, Laxmi Publications, Delhi.
4. Advanced Engineering Mathematics, Kreyzig-John Wiley, SMS, Newyork.

Reference Books:

1. Advanced Engineering Mathematics, Peter O'Neil, Cengage Learning.
2. Advanced Engineering Mathematics, M D Greenberg, Pearson Publications, Second edition.

Solapur University, Solapur
S.E. (Electronics) Semester-I
ELECTRONIC CIRCUIT ANALYSIS AND DESIGN-I

Teaching Scheme	**Examination Scheme**
Theory – 4 Hrs. /Week	**Theory –** 100 Marks
Practical – 2 Hrs. /Week	**Term-Work –** 25 Marks
	Practical & Oral Exam– 50 Marks

Course Objectives:

1. To understand working and applications of diode.
2. To introduce the students systematic design procedure for unregulated power supply
3. To understand working of bipolar junction transistor with basic configurations and hybrid model of BJT
4. To analyze application of BJT as an amplifier and multivibrator.
5. To introduce the students systematic design procedure for single stage amplifier.
6. To understand working of FET and its applications

Course Outcomes:

1. Students can demonstrate knowledge of working and applications of diode.
2. Students can analyze and design unregulated power supply.
3. Students can demonstrate knowledge of working and characteristics of BJT.
4. Students can analyze applications of BJT as an amplifier and multivibrator.
5. Students can analyze and design single stage amplifier.
6. Students understand working of FET and its applications.

SECTION I

Unit 1: Semiconductor diodes and its analysis: (06 Hrs.)

- **PN junction diode**: reviews of diode basics, diode characteristics using diode current equation, diode resistance, breakdown mechanism, junction diode switching times, transition & diffusion capacitance, AC & DC load line, effect of temperature, ratings of diode
- **zener diode**: characteristics, design of zener as a voltage regulator

Unit2: Diode applications: (12 Hrs.)

- **diode rectifiers:** half wave rectifier, full wave rectifier and bridge rectifier – its analysis for different parameters– $V_{o\,(avg)}$, $I_{o\,(avg)}$, $I_{o\,(rms)}$, $V_{o\,(rms)}$, ripple factor, efficiency, transformer utilization factor, peak inverse voltage
- **clippers:** series & shunt and its analysis for positive, negative & combinational biasing clippers, transfer characteristics
- **clamper circuits:** analysis for positive and negative clampers
- **voltage multipliers:** voltage doubler, tripler & qudraupler

Unit3: Design of unregulated power supply: **(09 Hrs.)**

Capacitor, inductor, LC & π filter its analysis for ripple factor & regulation; power supply design using rectifier & above filters including selection of transformer, diode & filter

Section – II

Unit4: Bipolar junction transistor: **(09 Hrs.)**

- **BJT characteristics** – review of transistor, BJT current components , common base, common emitter & common collector configuration with input output characteristics, early effect, punch through effect, transistor switching times and transistor as a switch
- **BJT biasing & stabilization**- DC load line and Q point, thermal runaway, analysis of biasing circuits – fixed, collector to base & self biasing and its expression for stability factor for all biasing circuit, design of biasing circuits using all above types, compensation techniques for BJT using Thermistor & PN diode

Unit5: Low frequency small signal BJT amplifier: **(08 Hrs.)**

- **Analysis of BJT using hybrid model:** hybrid model of BJT for CB, CE & CC configuration, generalized h-parameter analysis of BJT amplifier for A_v, A_i, R_i, R_o, A_{vs}, A_{is}, approximate h parameter model for CE configuration.
- **Transistor amplifier frequency response:** analysis of single stage CE amplifier, frequency response, factor affecting BW of amplifier, effect of emitter bypass capacitor C_e & coupling capacitor C_c on low frequency response
- **Design of single stage CE amplifier**

Unit6: Multivibrators using transistors: **(05 Hrs.)**

Analysis and design of astable and monostable multivibrators, analysis of bistable multivibrators, schmitt trigger

Unit7: Field effect transistor: **(05 Hrs.)**

- **N-channel JFET:** construction, characteristics, different configurations of JFET, parameters of JFET, application -JFET as an amplifier, JFET as VVR
- **MOSFET:** N channel depletion & enhancement – construction, characteristics, application as a switch.

Note: - Students shall refer to the data sheets for design

Term work:

- *Term work shall consist of minimum ten experiments based upon-*

1. Analysis & verification of full wave rectifier
2. Analysis & verification of clipper & clamper circuit
3. Analysis & verification of voltage multiplier circuit
4. V-I characteristics of zener diode & design of zener as voltage regulator
5. Design of unregulated power supply using bridge rectifier & capacitor filter
6. I/O characteristics of CE configuration & verification of h parameters
7. I/O characteristics of CB configuration& verification of h parameters
8. Design of single stage CE amplifier.
9. Performance analysis of astable multivibrator
10. Performance analysis of monostable multivibrator
11. Drain & transfer characteristics of JFET & verification of various parameters
12. Implement CS JFET amplifier & verify various parameters
13. Application of MOSFET as a switch.
14. Minimum two simulation of above circuits using any simulation software

Text books:

1. Electronic Devices and Circuits , David A. Bell ,Oxford University, Press India, Fifth edition
2. Electronic Device & Circuits, Millman Halkias ,Tata McGraw Hill, Third edition
3. Electronic Circuits Analysis and Design , Donald A Neamen ,Tata McGraw Hill
4. Electronic Devices and Circuits , Allen Mottershed, PHI Publication

Reference books:

1. Electronic Devices and Circuits , Robert Boylestad ,Prentice Hall International
2. Electronic Design Concept, Martin Roden Shroff, Reality Publications
3. Pulse, Digital & Switching Circuits, Millman Taub, McGraw Hill Publications
4. Electronic Circuit Design , Talbar Sontakke
5. Electronic Devices , Floyd, Pearson Education

Solapur University, Solapur
S.E. (Electronics) Semester-I
NETWORK THEORY AND ANALYSIS

Teaching Scheme
Theory – 4 Hrs. /Week
Practical – 2 Hrs. /Week

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

Course Objectives:

1. To understand basic theorems used for network analysis.
2. To understand two port networks and its parameters.
3. To understand series and parallel resonance and its effects.
4. To understand system behavior using pole zero plot.
5. To understand and implement filter approximations.

Course Outcomes:

1. Students can use different network theorems for network analysis.
2. Students can find different parameters of two port networks.
3. Students can demonstrate knowledge of resonance in a series and parallel circuits.
4. Students can analysis a network using pole and zero concepts.
5. Students can apply filter approximations to design analog passive filters.

SECTION I

Unit 1: Network analysis: **(12 Hrs)**

Network graphs: introduction to graph theory tree, link currents, branch voltages, incidence matrix, fundamental cut set and Tieset matrix; network theorems: review of basics, mesh and nodal analysis, superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Millmans theorem, reciprocity theorem, Tellegen's theorem; numerical problems on DC and AC circuits based on above with dependent & independent sources.

Unit 2: Resonance: **(08 Hrs.)**

Series resonance, impedance and phase angle of series resonant circuit, voltage and current in series resonant circuit, effect of resistance on frequency response curve, bandwidth, selectivity and quality factor; parallel resonant circuit (tank circuit), resonant frequency, variation of impedance with frequency, reactance curves, numerical problems based on above.

Unit 3: Two port networks: **(08 Hrs.)**

Relation between two port variables, open circuit impedance parameters(Z), short circuit admittance parameters(Y), transmission parameters(ABCD), hybrid parameters(h), reciprocity and symmetry conditions, relationship between parameter sets, parallel and series connections, cascading of two-port networks, T and π representation, terminated two-port network.

SECTION II

Unit 4: Transient response: (08 Hrs.)

Review of Laplace transform, initial conditions, evaluation and analysis of transient and steady state response of following:

-RL circuit DC voltage response
-RC circuit DC current response
-RLC circuit DC voltage response
-RL circuit sinusoidal response

Unit 5: Filters and attenuators: (09 Hrs.)

Characteristic of high pass, low pass and band pass and band stop filter; constant K type filters, m-derived filter, section m derived LPF, HPF, BPF and BSF; attenuators: Neper & Decibels, L, T and π type, lattice attenuators

Unit 6: Fundamentals of network synthesis: (09 Hrs.)

Concept of complex frequency, network function for one port and two port network, poles and zeros of network function, restriction on poles and zero location of driving point function and transfer function; time domain behavior from poles and zero plot, stability of active network & Routh criterian.

Term Work:

- *Term work shall consist of minimum eight experiments based upon-*

1. Verification of superposition theorem.
2. Verification of Tellegen's theorem.
3. Frequency response of series resonance circuit.
4. Step response of RC circuit.
5. To verify Z and Y parameters.
6. To verify H-parameters.
7. To design LPF low pass filter, to plot frequency response & to find cut off frequency.
8. To design constant HPF high pass filter, to plot frequency response & to find cut off frequency
9. Design of attenuators L-type and T-type.
10. Design of attenuator π-type.
11. Minimum two Simulation Experiment using any Simulation software

Text books:

1. Circuit & network analysis and synthesis, A Sudhakar, Shaymmohan, S Palli, TMH Publications
2. A Course in Electrical Circuit Analysis, Sony Gupta, Dhanpatroy & Son's Publications
3. Electrical Circuit Analysis, S. Sivanagaraju, G. Kishor, Cengage Learning

Reference books:

1. Network Analysis, M.E. Van Valkenburg, PHI Publications
2. Theory and problems of Electric Circuits ,Joseph A Edminster, Shaum series
3. Network & System, D. Roy Choudhary, Wiley Eastern, Second edition
4. Network Analysis & Synthesis, F.F.Kuo, John Wiley & Sons, Second edition

Solapur University, Solapur
S.E. (Electronics) Semester-I
DIGITAL LOGIC DESIGN

Teaching Scheme
Theory – 4 Hrs. /Week
Practical – 2 Hrs. /Week

Examination Scheme
Theory – 100 Marks
Term-Work – 25 Marks
Practical & Oral Exam - 25 Marks

Course Objectives:

1. To introduce concept of digital logic, digital signal and digital electronics and its advantages
2. To introduce various basic gates
3. To introduce various number systems and Boolean algebra
4. To introduce CMOS and TTL families along with their vital parameters
5. To understand combinational and sequential circuit design
6. To introduce concept of synchronous state machine
7. To understand programmable logic devices

Course Outcomes:

1. Students grasp underlying concept of digital logic, signal and circuits.
2. Students can use various logic gates to design a logic circuit
3. Students understand various number systems, Boolean algebra and are able to solve relevant problems
4. Students realizes CMOS and VLSI families along with their vital parameters
5. Students cad design combinational and sequential circuit
6. Students can use concept of synchronous state machine for solving design problems
7. Students understands programmable logic devices

SECTION I

Unit 1: Number system and codes: (04 Hrs.)
Review of number system and base conversions; representation of signed numbers, positional number system; binary codes for decimal numbers, gray code, error detecting and correcting codes - parity check codes and hamming code

Unit 2: Boolean algebra: (10 Hrs.)
Theorems of Boolean algebra, DeMorgan's law; standard representation of logic functions – SOP, POS and canonical forms; simplification of Boolean functions - Karnaugh maps; EX-OR and equivalence operations, NAND and NOR Implementations; circuit timing – timing diagram, propagation delay, timing hazards - static and dynamic, designing hazard free circuits

Unit 3: Combinational circuit design: (10 Hrs.)
Design procedure; design of adders, subtractors and binary parallel adder, code conversion, design of multiplexers, de-multiplexers, encoders, decoders and their applications; design of comparators and parity Circuits; standard MSI circuits.

Unit 4: Logic families: **(06 Hrs.)**

Parameter definitions - noise margin, power dissipation, voltage and current parameters, propagation delay, typical values for TTL, CMOS & ECL, input/output profile for TTL & CMOS; TTL logic families-standard TTL, Totem-pole, open collector, tri-state (concept & application); significance of TTL sub families (L, H, LS, S) & MOS family-importance of (C, HC), PMOS, NMOS (inverter only), CMOS (inverter, AND & NOR); CMOS-TTL interfacing, comparison of TTL & CMOS.TTL compatible high speed CMOS series

SECTION- II

Unit 5: Sequential circuit design: **(10 Hrs.)**

Latches - S-R latch; flip-flops: S-R, J-K, D, T and Master-slave, triggering of flip-flops, flip-flop characteristic equations and excitation tables; flip-flop applications – counters, registers, clock generation

Unit 6: Synchronous state machine design: **(10 Hrs.)**

State machine structures - Mealy and Moore machines; design of state machines - state table, state assignment, transition/excitation table, excitation maps and equations, logic realization; design of sequence generators and detectors.

Unit 7: Programmable logic devices: **(04 Hrs.)**

Programmable logic arrays, programmable array logic and their applications- sequential PLDs

Term Work:

- *Term work shall consist of minimum ten experiments based upon-*

1. Verification of truth table of basic and universal gates.
2. Implementation of universal gates using basic gates.
3. Code conversion using logic gates: binary to gray, gray to binary, binary to excess-3.
4. Implementation of any one combinational circuit using multiplexer.
5. Implementation of any one combinational circuit using de-multiplexer.
6. Design a 2-bit comparator using logic gates; implement a 4-bit magnitude comparator
7. Perform 1's and 2's complement adder/subtraction using 4 bit parallel adder (IC 7483).
8. Convert J-K flip-flop to T (Toggle) flip-flop and D (Data) flip-flop.
9. Design and implement mod-n asynchronous counter.
10. Design and implement mod-n counter using decade counter IC 7490.
11. Design and implement mod-n synchronous counter.
12. Design and implement mod-n counter using synchronous 4-bit binary up/down counter IC 74191.
13. Design and implement a 4 bit bi-directional shift register.
14. Implement a Johnson ring counter.
15. Design and implement a sequence detector (Mealy or Moore machine).

Text books:

1. Digital Design, M. Morris Mano ,PHI, Third edition
2. Modern Digital Electronics, R. P. Jain ,TMH, Third edition
3. Digital Electronics, Subrata Ghoshal, Cengage Learning, First edition

Reference books:

1. Digital Design: Principles and Practices, Wakerly John F. ,Pearson Education, Forth edition
2. Digital Principles & Applications, Leach, Malvino, Sixth edition

Solapur University, Solapur
S.E. (Electronics) Semester-I
DATA STRUCTURES

Teaching Scheme
Theory – 3 Hrs/Week
Practical – 2 Hr/Week

Examination Scheme
Theories – 100 Marks
Term-Work – 25 Marks
Practical & Oral Exam - 50 Marks

Course Objectives:

1. To understand data structure and its real life applications.
2. To understand basics and implementation of stack, queues, linked list.
3. To understand need of recursion and its applications.
4. To understand different nonlinear data structures.
5. To understand searching methods and different sorting techniques.

Course Outcomes:

1. Students can implement stack, queues, and linked list.
2. Students understand concept of recursion.
3. Students understand different nonlinear data structures and their applications.
4. Students can implement different searching and sorting techniques.

SECTION I

Unit 1: Stack and queues: **(10 Hrs)**
Introduction to data structure, examples and real life applications, stack definition, static implementation using arrays, operations on stack, applications of stack; queue definition, operations on simple queue using arrays, operations on circular queue using arrays & concept of de queue and priority queue, applications of queue.

Unit 2: Lists: **(06 Hrs.)**
Definition, representation and operations on linked list, types of linked lists: singly linked list, circular linked list, stack using linked list, queue using linked list, concept of doubly linked list.

Unit 3: Recursion: **(04 Hrs.)**
Recursion in C, how recursion works, designing recursive algorithms, examples of recursion

SECTION II

Unit 4: Trees: **(06 Hrs.)**
Definition of trees, binary trees, representation of tree, operations on the binary tree, binary search trees, concepts of threaded binary trees, B-tree, B+ tree, AVL tree

Unit 5: Graph: **(06 Hrs.)**

Definition and examples of graphs, types of graph, computer representation of graphs, graphs traversal methods: depth first search, breadth first search.

Unit 6: Searching and sorting techniques: **(08 Hrs.)**

Linear search, binary search, bubble sort, selection sort, insertion sort, merge sort, quick sort, heap sort, definition of hashing, hash functions, collision, open hashing, close hashing

Term work:

Term work shall consist of minimum ten experiments based upon above curriculum

Text books:

1. Data Structures -A Pseudicode Approach with C, Richard F.Gilberg, Behrouz A. Forouzan, Cengage Learning, Second edition
2. Data structure using C, ISRD Group, The McGraw-Hill Companies Ltd.
3. Data Structure using C & C++, Rajesh K. Shukla, WILEY India.
4. Data Structure through C in Depth, S.K. Srivastava, Deepali Srivastava, BPB Publications

Reference books:

1. Fundamentals of Data Structures, Ellis Horowitz, Sartaj Sahani, Galgotic Book Source.
2. Data Structures and program design, Robert L. Kruse, Easter Economy Edition, PHI Private Limited, Edition-III
3. Data Structure using C & C++, Y.Langsam, M.J. Augenstein, A.M Tanenbaum, PHI Second edition
4. C and Data structures, Ashok N.Kamthane, Pearson Education
5. Understand Pointers in C, Yashwant Kanetkar, BPB Publication, Third edition

Solapur University, Solapur
S.E. (Electronics) Semester-I
ELECTRONIC WORKSHOP

Teaching Scheme
Practical – 2 Hrs./Week
Tutorial – 1 Hr. / Week

Examination Scheme
Term-Work – 50 Marks

Course Objectives:

1. To understand and use different electronic instruments
2. To understand and use different electronic components
3. To simulate electronic circuits using suitable simulation software
4. To understand electronic measurement of different physical parameters
5. To understand procedure for PCB making

Course Outcomes:

1. Students can use different electronic measuring instruments
2. Students can test different electronic components
3. Students can simulate electronic circuits using simulation software and can interpret results
4. Students understand different transducers used for measurement of physical quantities
5. Students understand PCB making procedure

SECTION I

Unit 1: Introduction to electronic devices and measuring instruments
CRO – Analog and digital oscilloscope, working and measurement using oscilloscope, multi-meters, signal generator, function generator

Unit 2: Testing of basic electronic components:
Passive components: Resistors and types, capacitors and types, inductors– low power, high power; Transformer types–power, audio, pulse, RF, current; active components: testing of diodes, testing of BJT & FET using digital multi-meter, ratings of all above devices;
Miscellaneous components:

- Wires & cables–different types like single strand, multi strand , ribben cable, co-axial cable (75Ω), TV antenna cable (300 Ω)
- Switches: SPDT, DPDT, rotary, micro, sliding
- Relays: general purpose, PCB mounting
- Wire connector: relimate, power connector, D type, FRC, registered jack (RJ-45 & RJ-6)

Unit 3: Circuit simulation using software tools:
Introduction, description of any simulation software tool like OrCAD / PROTEUS
Schematic description: input files, element values, nodes, circuit elements, sources, output variables, format of circuit & output files, drawing the schematic and simulation

SECTION II

Unit 4: Transducers:
Measurement of distance, weight, speed, temperature using various transducers

Unit 5: Printed circuit boards (PCB):
Types – single & double sided, layout procedure, artwork, fabrication, etching process, chasis preparation, soldering and de-soldering techniques, PCB design using software tool

Unit 6: Mini project:
Includes circuit using discrete electronic components / digital ICs– it's testing, PCB designing, report writing

Term Work:

- *Term work shall consist of minimum ten experiments based upon-*

1. Electrical parameters measurement using CRO.
2. Identification & testing of various electronic components
   a. resistors b. capacitors c. inductors d. transformers e. diodes f. transistors g. relays h. switches
3. Measurement of – distance, weight, speed & temperature using various transducers and instrumentation tutor set up
4. Simulation of electronic circuits- Simulation of below or other circuits studied in ECAD-I, NTA, DT using software simulation tool like OrCAD / PROTEUS (Minimum 5 circuits)
   - Diode applications - rectifiers , filters, clippers, clampers & multipliers
   - BJT characteristics & its applications like amplifier, multivibrator
   - FET characteristics & its applications
   - Resonance phenomenon, RLC circuits & filter response
   - Digital circuits based on 74XX ICs
5. PCB designing: artwork, etching process.
6. Mini project

Reference Books:

1. User manuals of PROTEUS, OrCAD, Multisim
2. Electronic Components & Materials, Dr. Madhuri A. Joshi, Shroff Publishers & Distributors
3. Electronic Instrumentation, H S Kalsi, Tata McGraw Hill Publications.
4. Audio Video Systems , R.G. Gupta , TMH Publication
5. A course in Electrical and Electronics Measurements and Instrumentation , A.K. Sawhney Dhanpat Rai & Co
6. Printed Circuit Boards- Design & Technology, W.C.Bosshart; Tata Mc-Graw –Hill Publications.

Solapur University, Solapur
S.E. (Electronics) Semester-II
ELECTRICAL MACHINES

Teaching Scheme	Examination Scheme
Theory – 3 Hrs. /Week	**Theory –** 100 Marks
Practical – 2 Hrs. /Week	**Term-Work –** 25 Marks
	Oral Exam - 25 Marks

Course Objectives:

1. To understand electrical energy system.
2. To understand speed control, starting and braking of dc motors.
3. To understand working of different single phase special motors.
4. To understand different methods of three phase power measurement.
5. To understand working of three phase induction motors and three phase transformer.
6. To understand application of electrical drives.
7. To understand importance of power factor improvement.

Course Outcomes:

1. Students understand basic structure of electrical energy system.
2. Students understand working, speed control, starting and braking of dc motors and three- phase induction motors.
3. Students understand working of different single phase special motors.
4. Students understand electrical drives and three phase power measurement.
5. Students understand three phase transformer connections.
6. Students understand importance of power factor improvement.

SECTION I

Unit 1: Electrical energy system: (04 Hrs)

Generalized ac power supply system, generation, transmission and distribution, non conventional energy sources - solar and wind

Unit 2: D .C. motors: (08 Hrs.)

Working principle, concept of back e.m.f, types .characteristics- speed Vs torque, speed Vs armature current & torque Vs armature current, speed control methods-voltage control method, armature rheostat control method &flux control method, study of starters- 3-ptand 4-pt starter & electronic starters, testing of dc motors-no load test and brake load test, electrical braking -plugging, dynamic & regenerative braking.

Unit 3: Special motors: (05 Hrs.)

Working principle, construction, types & applications of single phase induction motors (split phase, capacitor-start, capacitor -start and run), universal motor, shaded pole motor, brushless dc motor & linear induction motor.

Unit 4: Three phase power measurement: (04 Hrs.)
Introduction to three phase power measurement, three phase power measurement in balanced load by three, two & one wattmeter method.

SECTION II

Unit 5: Three phase induction motors: (08 Hrs.)
Working principle, types .starting torque ,full load torque, running torque and condition for the maximum torque, torque-slip characteristics .power flow diagram , speed control methods-stator side control, rotor side control and electronic methods, electrical braking, starters-DOL, star-delta, auto transformer & electronic starters.

Unit 6: Electrical drives: (03 Hrs.)
Introduction, concepts of drives, types, selection criteria of motor for different applications

Unit 7: Transformers: (06 Hrs.)
Introduction, working principle of three-phase transformer, construction details, connection diagrams-star-star, delta-delta, delta-star, star-delta, V-V and T-T connections, special transformers-single phase auto transformer, current transformer & potential transformer.

Unit 8: Power factor improvement: (03 Hrs.)
Causes of low power factor, effect of low power factor & its disadvantages, different methods for power factor improvement

Term work:

- *Term work shall consist of minimum ten experiments based upon-*

1. Speed control of dc shunt motors by flux control method.
2. Speed control of dc shunt motors by armature voltage control method.
3. Armature current Vs torque characteristics of dc shunt motor.
4. Armature current Vs speed characteristics of dc shunt motor.
5. N test on dc shunt motor.
6. Break load test on dc motor.
7. Study of starters used for dc motor.
8. Torque Vs slip characteristics of three-phase induction motor.
9. Verification of three phase transformer connection.
10. Load test on three phase induction motor.
11. Study of starters used for three phase induction motor.
12. Three phase power measurement by two wattmeter method.
13. Three phase power measurement by one wattmeter method.
14. Break load test on single phase induction motor.
15. Two experiments based on MATLAB Simulations.

Text books:

1. Text book of Electrical technology Volume I & II, , B.L. Theraja, S. Chand publications, edition- 21st revised
2. Principles of Power Systems, V.K Mehta, S.Chand Group Publications, Forth Edition,
3. Fractional and sub-fractional horse power electric motors, Veinott and Martin McGraw-Hill Publications, Electrical and Mechanical Engineering Series, Fourth edition

Reference books:

1. Electrical technology, H. Cotton, CBS Publishers and Distributors, Seventh edition
2. Electrical Power, S.L. Uppal, Khanna Publishers, Delhi, Thirteenth edition
3. A course in Electrical & Electronics Measurement & Instrumentation, A.K.Sawhney, Bernard Davis, Dhanpatrai & Co Pvt Ltd, Fourth edition

Solapur University, Solapur

S.E. (Electronics) Semester-II

ELECTRONIC CIRCUIT ANALYSIS AND DESIGN-II

Teaching Scheme	**Examination Scheme**
Theory – 4 Hrs. /Week	**Theory –** 100 Marks
Practical – 2 Hrs. /Week	**Term-Work –** 25 Marks
	Practical & Oral Exam – 50 Marks

Course Objectives:

1. To understand analysis of multistage transistor amplifier.
2. To understand analysis and design of feedback amplifiers and power amplifiers.
3. To understand analysis and design of oscillators and waveform generators.
4. To understand working and design of timer circuits using IC 555 and its applications.
5. To understand analysis and design of transistorized series voltage regulators.
6. To understand working of different voltage regulator ICs and to design voltage regulators using them

Course Outcomes:

1. Students can analyze multistage amplifier.
2. Students can analyze and design feedback amplifier and power amplifier.
3. Students can analyze and design oscillator and waveform generator.
4. Students understand working and design of timer circuits using IC 555 and its applications.
5. Students can analyze and design transistorized series voltage regulators.
6. Students understand working of different voltage regulator ICs and can design voltage regulators using them.

SECTION I

Unit 1: Multistage transistor amplifiers: (06 Hrs.)

Need of cascading, different coupling schemes, frequency response of multistage amplifier, two stages RC coupled & direct coupled amplifier – its analysis for overall voltage gain.

Unit 2: Feedback in amplifiers and feedback amplifier design: (10 Hrs.)

Principle of feedback in amplifier, effect of negative feedback on stability, bandwidth, input impedance, output impedance, noise and distortion; feedback methods – voltage series, voltage shunt, current series & current shunt–their analysis, design of two stage RC coupled amplifier involving voltage series & current series feedback, analysis of emitter follower, darlington amplifier using bootstrapping principle

Unit 3: Power amplifiers: **(10 Hrs.)**

Need of power amplifiers, classification of power amplifier, class-A direct coupled & transformer coupled amplifier- its analysis & design ,class B and class B push pull amplifier– its analysis & design, cross over distortion, class C & class AB push pull amplifier and complementary symmetry power amplifier

Section – II

Unit 4: Oscillators: **(09 Hrs.)**

Condition for oscillations

- LC oscillator- General form, Hartley, Colpitts – its analysis and design
- RC oscillators- Phase shift, Wien bridge oscillator – its analysis and design
- Crystal oscillator

Unit 5: Pulse and integrated circuits: **(10 Hrs.)**

- Astable multivibrator using IC555– analysis of duty cycle & frequency, application as– square wave generator, voltage controlled oscillator
- Monostable multivibrator using IC555 – analysis for pulse width, application as- frequency divider, PWM, linear ramp generator, missing pulse detector.
- Other applications of IC 555 – bistable multivibrator, schmitt trigger, design of –timer circuit, power ON delay circuit, wide range pulse generator
- Pulse generation using IC 74121 & IC 74123.

Unit 6: Regulated power supply – **(07 Hrs.)**

- Transistorized series voltage regulator: design of – series pass & series pass with pre regulator, power supply protection circuits– short circuit protection, fold back current limiting, overvoltage protection, thermal shutdown
- IC regulator - fixed voltage regulator using IC 78XX & 79XX series, design of constant current source using 78XX.
- Variable voltage regulator using IC LM 317 & LM 337, design of variable voltage regulators using LM 317 & LM 337
- Design of dual tracking regulator using above ICs, features of IC voltage regulator, current boosting in voltage regulator

Note: - Students shall refer to the data sheets for design

Term Work:

- *Term work shall consist of minimum ten experiments based upon–*

1. Analysis of multistage BJT amplifier and verifying its parameters
2. Design of two stage Voltage series feedback amplifier using BJT.
3. Design of two stage Current series feedback amplifier using BJT.
4. Frequency response of push pull / complementary symmetry power amplifier.
5. Design of RC Phase shift oscillator for different amplitude and frequency.
6. Analysis of Colpitt / Hartley oscillator.
7. Design of astable multivibrator.
8. Design of monostable multivibrator.
9. Design of power ON delay circuit.
10. Schmitt trigger
11. Voltage controlled oscillator
12. Design of transistorized series voltage regulator
13. Design of fixed voltage regulator using 78XX & 79XX
14. Design of adjustable voltage regulator using LM317 & 337
15. To simulate the following using any simulation software
    - Frequency response of a multistage BJT amplifier, two stage voltage series & current series feedback amplifier using BJT
    - Power amplifier using BJT
    - Oscillators - RC phase shift, Wien Bridge, Colpitt , Hartley oscillator
    - Timer circuits - Astable & Monostable multivibrator

Text books:

1. Electronic Device & Circuits, Millman Halkias ,Tata McGraw Hill, Third edition
2. Electronic Devices and Circuits , Allen Mottershed , PHI Publication
3. Electronic Devices and Circuits , S Salivahanan & N Suresh Kumar, Tata McGraw Hill, Third edition
4. Electronic Circuits Analysis & Design ,Donald A Neamen ,Tata McGraw Hill

Reference books:

1. Electronic Devices , Floyd, Pearson Education
2. Electronic Design Concept, Martin Roden Shroff, Reality Publication.
3. Electronic Circuit Design , Talbar Sontakke
4. Electronic Devices and Circuits , David A. Bell ,Oxford University Press India, Fifth Edition

Solapur University, Solapur
S.E. (Electronics) Semester-II
ANALOG COMMUNICATION

Teaching Scheme
Theory – 3 Hrs. /Week
Practical – 2 Hrs. /Week

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

Course Objectives:

1. To understand essential components of communication system and need of modulation
2. To understand concept of noise and its effects
3. To understand amplitude & frequency modulation and demodulation and its mathematical background
4. To understand working of electronic telephony system a
5. To understand nature and behavior of wave propagation and basic principle of different antenna systems
6. To simulate some of above systems using suitable simulation tool

Course Outcomes:

1. Students describe basic components of communication system and explains need of modulation
2. Students understand concept and types of noise
3. Students describe amplitude and frequency modulation and demodulation and can do analysis in time and frequency domain
4. Students understand nature and behavior of wave propagation and basic principle of different antenna systems
5. Student can simulate components of communication system using simulation software and can interpret results

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SECTION I

Unit 1: Introduction to electronic communication: (03 Hrs)
Importance & elements of communication systems, types, applications, time and frequency domains, the electromagnetic spectrum, decibels, bandwidth, need of modulation & types

Unit 2: Amplitude modulation: (06 Hrs.)
Mathematical representation, modulation index, modulation percentage, waveforms, frequency spectrum, over and under modulation, power relation, high & low level modulation block diagram, transmitter requirements, modulated class C amplifier AM transmitter, comparison of high & low level modulators

Unit 3: Power efficient AM: **(05 Hrs.)**

Inefficiency of DSB, suppression of carrier using balanced modulator, suppression of sidebands – filter, phase shift & third methods, ISB, VSB, applications

Unit 4: AM receivers: **(07 Hrs.)**

AM detection- diode detector, distortion in diode detector, radio receiver characteristics – sensitivity, selectivity, TFR receiver, disadvantages of TFR receiver, super-hetrodyne receivers, frequency conversion, image frequency & selection, receiver circuits for mixer, AGC, communication receivers

SECTION II

Unit 5: Angle modulation: **(10 Hrs.)**

Mathematical representation of FM and PM, waveforms of FM and PM, FM- frequency deviation, modulation index, percentage, angle modulation spectrum, Bessel function, Carson's rule, narrowband & wideband FM, relationship between FM and PM, comparison of FM and AM, pre emphasis and de emphasis, FM generation – direct and indirect, theory of reactance modulator, reactance modulator circuits, varactor modulator, crystal oscillator modulator, mathematical representation of indirect method of FM, Armstrong method of FM, FM detectors – slope, balanced, Foster Seeley, Ratio

Unit 6: Telephony: **(05 Hrs.)**

Telephone set, transmitter, receiver, telephone in a local loop, pulse and DTMF dialing, tones, need of switching, manual switching, Strowger system, crossbar switching, electronic exchange, electronic telephone, cordless telephone, network traffic load and parameters, grade of service and blocking parameters

Unit 7: Noise: **(03 Hrs.)**

Noise & communication – external noise, internal noise, addition of noise, signal to noise ratio, noise figure, noise temperature

Unit 8: Radio wave propagation: **(03 Hrs.)**

Propagation of signal through line, propagation of signal through radio waves – ground, sky & LOS, concept of radiation and basic antenna system, antenna characteristics

Term work:

- *Term work shall consist of minimum ten experiments based upon-*

1. AM modulation & demodulation techniques
2. Single sideband techniques
3. Angle modulation & demodulation techniques
4. Radio receivers
5. Spectrum analysis of modulation using spectrum analyzer
6. Telephony system
7. Noise measurement
8. Antenna characteristics
9. Minimum 4 experiments using suitable software simulation tool

Text books:

1. Electronic Communications Systems, Roy Blake, Cengage Learning, Second edition.
2. Communication Electronics –Principles and Applications, Lois E. Frenzel, Tata McGraw Hill Education Pvt. Ltd; Third edition.
3. Electronic Communication Systems, George Kennedy, Bernard Davis, Tata McGraw Hill Publishing Company Ltd; Forth edition.

Reference Books:

1. Electronic Communications – Modulation and Transmission, Robert J. Schoenbeck, Prentice Hall of India Pvt. Ltd.
2. Digital and Analog Communication Systems, K Sam Shanmugam, Wiley Student Edition
3. Telecommunication Switching Systems and Networks, Thiagarajan Viswanathan, Prentice Hall of India Pvt. Ltd.
4. Electronic Communications, 4th edition, Dennis Roddy, John Coolen, Prentice Hall of India Pvt. Ltd.

Solapur University, Solapur
S.E. (Electronics) Semester-II
LINEAR INTEGRATED CIRCUITS

Teaching Scheme	**Examination Scheme**
Theory – 4 Hrs. /Week	**Theory –** 100 Marks
Practical – 2 Hrs. /Week	**Term-Work –** 25 Marks
	Practical & Oral Exam - 50 Marks

Course Objectives:

1. To understand working and specifications of ideal and practical op amp
2. To understand frequency response of op amp
3. To understand general and non linear applications of op amp
4. To design active filters using op amp and analyze oscillator applications
5. To understand working of PLL and data converters

Course Outcomes:

1. Students understand working of op amp and characteristics of ideal and practical op amp
2. Students understand frequency response of op amp
3. Students analyze different linear and non linear applications of op amp
4. Students can design first and second order filter and can analyze oscillators
5. Students understand monolithic PLL and its application in VCO
6. Students understand data converter techniques and can use monolithic data converter

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SECTION I

Unit 1: Op amp fundamentals: (10 Hrs)

Op amp block diagram, analysis of equivalent circuit, op amp parameters- ideal & practical, equivalent circuit of op amp, ideal voltage curve, open loop applications, necessity of feedback, voltage series feedback amplifier – voltage gain, input resistance, output resistance, bandwidth, total output offset voltage, voltage follower, voltage shunt feedback amplifier- voltage gain, input resistance, output resistance, bandwidth, total output offset voltage ,current to voltage converter, inverter, differential amplifier with one op amp- voltage gain, input resistance, bandwidth, differential amplifier with two op amps- voltage gain, input resistance, bandwidth, 741 op amp, FET op amp

Unit 2: Practical op amp: (06 Hrs.)

Input offset voltage, offset voltage compensation network for different configuration, input bias current, total output offset voltage, effect of change in temperature and supply voltage

Unit 3: Frequency response of op amp: (05 Hrs.)
Frequency response, compensating networks, high frequency op amp equivalent circuit, open loop and closed loop gains as a function of frequency, multistage roll off, circuit stability, slew rate and its effect

Unit 4: General applications of op amp: (05 Hrs.)
Summing, scaling and averaging amplifier, instrumentation amplifier, V to I converter with floating and grounded load, I to V converter, integrator, differentiator

SECTION II

Unit 5: Non linear applications of op amp: (08 Hrs.)
Basic comparator, zero crossing detector, Schmitt trigger, window detector, half wave and full wave rectifiers, peak detector, peak to peak detector, phase detector, precision rectifiers, clipper, clamper, sample and hold, log and antilog amplifier, current source, voltage source

Unit 6: Active filters and oscillators: (08 Hrs.)
Active filters introduction, first order low pass Butterworth filter, second order low pass Butterworth filter, first order high pass Butterworth filter, second order high pass Butterworth filter, higher order filters, wide and narrow band pass filters, band reject filters, all pass filters, oscillator principle, types, phase shift oscillator, Wien bridge oscillator, triangular, square and saw tooth wave generator

Unit 7: Phase locked loop: (04 Hrs.)
PLL Operating principle, block diagram, monolithic VCO and PLL, PLL applications – frequency multiplier, FSK demodulator

Unit 8: Signal converters: (06 Hrs.)
Basic DAC techniques- weighted resistor, R-2R ladder, monolithic DAC- 1408, ADC techniques- Flash, successive approximation, single & dual slope, monolithic ADC- 0816, DAC and ADC specifications

Term Work:

- *Term work shall consist of minimum ten experiments based upon-*

1. Parameter measurement
2. Inverting and non inverting amplifier configuration
3. Frequency response and gain bandwidth product
4. Linear applications
5. Non linear applications
6. Active filter design
7. Waveform generator
8. Design of DAC
9. Minimum 2 experiments using suitable software simulation tool

Text books:

1. Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI Learning Pvt.Ltd., Fourth edition
2. Design with Operational Amplifiers and Analog Integrated Circuits, Sergio Franco,Tata McGraw-Hill Publishing Company Ltd., Third edition
3. Linear Integrated Circuits, D. Roy Choudhary, Shail B. Jain, New age International Publishers, Third edition

Reference books:

1. An introduction to Operational Amplifiers, Lucas M. Faulkenberry, John Wiley & Sons, Second edition
2. Operational Amplifiers, G.B. Clayton, English Language Book Society, Second edition
3. Operational Amplifiers and Linear Integrated Circuits, Robert F. Coughlin, Frederick F. Driscoll, Prentice Hall of India Pvt. Ltd., Fourth edition

Solapur University, Solapur
S.E. (Electronics) Semester-II
SIGNALS AND SYSTEMS

Teaching Scheme
Lectures – 4 Hrs. /Week
Tutorial – 1 Hr/Week

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

Course Objectives:

1. To introduce with signals & systems and their types.
2. To understand impulse response and the concept of convolution.
3. To apply & analyze different transforms

Course Outcome:

1. Students understand different types of signals and systems.
2. Students can compute convolution integral and convolution sum.
3. Students can apply appropriate transforms for a specific application.

SECTION I

Unit 1: **Signals and systems:** **(09 Hrs.)**

Continuous time signals - discrete time signals – periodic and aperiodic signals – even and odd signals – energy and power signals –deterministic and random signals –complex exponential and sinusoidal signals .unit step, unit ramp, unit impulse – representation of signals in terms of unit impulse, operations on signals: amplitude scaling, addition, multiplication, differentiation, integration (accumulator for DT), time scaling, time shifting and folding; continuous time systems- discrete time systems - linear system – time invariant system – causal system – BIBO system – systems with and without memory – LTI system.

Unit 2: System analysis: **(08 Hrs.)**

System modeling: input output relation, impulse response, block diagram; definition of impulse response, convolution integral, convolution sum, computation of convolution integral & convolution sum properties of convolution, system interconnection, system properties in terms of impulse response, step response in terms of impulse response

Unit 3: Fourier analysis for continuous-time signals and systems: **(08 Hrs.)**

Introduction, definition and necessity of CT and DT Fourier series and Fourier transforms. CT Fourier series, CT Fourier transform and its properties, problem solving using properties, amplitude spectrum, phase spectrum of the signal and system; limitations of FT and need of Laplace transform and Z transform

SECTION II

Unit 4: Sampling: (06 Hrs.)
Representation of CT signal by samples, sampling theorem, reconstruction using interpolation, under sampling/aliasing

Unit 5: System analysis using Laplace and Z transform: (05 Hrs.)
Overview of LT & ZT, analysis and characteristics of LTI system using ZT & LT, Wiener - Khinchin theorem of system

Unit 6: Correlation and spectral density: (06 Hrs.)
Definition of correlation and spectral density, correlogram, auto-correlation, cross correlation, energy/power spectral density, properties of correlation and spectral density, inter relation between correlation and spectral density

Unit 7: Probability, random variables and random signals: (08 Hrs.)
Experiment, sample space, event, probability, conditional probability and statistical independence; random variables: continuous and discrete random variables, cumulative distributive function, probability density function, properties of CDF and PDF; statistical averages, mean, moments and expectations, standard deviation and variance; probability models: uniform, Gaussian, binomial

Term work:

- *Tutorial session shall be based upon-*

1. Study of operations on signals.
2. Folding, shifting, scaling of CT DT signals
3. Generation of basic signals like sine, cosine, impulse, unit step ramp etc
4. Convolution sum, convolution integral & correlation
5. Even & odd parts of signals
6. Step and impulse response of system
7. Impulse response using Laplace transform
8. Numerical on sampling theorem
9. Pole-Zero plot of Z-transform
10. Realization structures of system
11. Sampling continuous time signals
12. Stability criterion

Text books:

1. Signals and Systems, A.V. Oppenheim, A. S. Wilsky, PHI Publication**.**
2. Analog and Digital Communication systems, Martin Roden
3. Probability, Random Variable, Random Processes; Peyton Peebles, Tata Mc-Graw Hill, Forth edition.
4. Introduction to Analog and Digital Communications, Simon Haykins, Wiley India

Reference books:

1. Signals and Systems, Simon Haykin, Barry Van Veen , John Wiley & Sons
2. Signals and Systems, M. J. Roberts, TMH
3. Signals and Systems, Ghosh, Pearson Education.
4. Signals, Systems and Transforms, Charles Phillips, Pearson Education, Third Edition,

Solapur University, Solapur
S.E. (Electronics) Semester-II
SOFTWARE SIMULATION TOOLS

Teaching Scheme
Practical – 2 Hr/Week
Tutorial - 1 Hrs / week

Examination Scheme
Term-Work – 50 Marks

Course Objectives:

1. To provide students with a hands-on introduction to MATLAB and SIMULINK platform
2. To demonstrate the use of MATLAB and SIMULINK as a tool to simulate electronic circuits
3. To demonstrate the use of OrCAD/PROTEUS as a tool to simulate electronic circuits

Course Outcomes:

1. Students can write program using different features of MATLAB
2. Students can use simple SIMULINK blocks along with MATLAB program
3. Students can simulate different electronic circuits using MATLAB
4. Students can simulate different electronic circuits using OrCAD/PROTEUS

SECTION - I

Unit 1: MATLAB Fundamental:
MATLAB Environment, constants, variables and expressions, operators, matrix operations, vectors, complex numbers, math functions, input –output, control structures-loops and branching

Unit 2: MATLAB Functions:
M files and script files, function subprograms, types of functions, functions handling, errors and warnings, MATLAB debugger

Unit 3: MATLAB Graphics:
Two dimensional plots, multiple plots, sub plots, specialized two dimensional plots, three dimensional plots

SECTION - II

Unit 4: Simulation using MATLAB:
Introduction to Simulink, modeling, commonly used blocks, Simulation using MATLAB / Simulink - rectifiers, filters, series and parallel circuits, validation of network theorems, resonance circuits, any other circuits / concepts covered in Electronic Circuit Analysis and Design I and Network Theory and Analysis courses

Unit 5: Simulation using other software simulation tools:
Simulation of circuits using software simulation tool like OrCAD / PROTEUS – multistage transistor amplifiers, feedback amplifiers, power amplifiers, oscillators, multivibrators, Op amp configurations, Op amp applications, active filters, any other circuits / concepts covered in Electronic circuit analysis and design II and Linear integrated circuits courses

Term work:

- *Term work shall consist of minimum ten experiments based upon-*

1. MATLAB Programming – Students shall solve/simulate simple electronic circuit related problems to learn various MATLAB features / concepts
2. Simulation of circuits / concepts covered in Electronic Circuit Analysis and Design I and Network Theory and Analysis Course using MATLAB/ SIMULINK
3. Simulation of circuits / concepts covered in Electronic Circuit Analysis and Design II and Linear Integrated Circuits courses using OrCAD/PROTEUS

Text books:

1. MATLAB and its application in Engineering, R.K.Bansal, A.K.Goel and M.K.Sharma, Pearson Education
2. MATLAB & Simulink, Agam Kumar Tyagi, Oxford University Press
3. Getting starting with MATLAB-7, Rudra Pratap, Oxford University Press

Reference books:

1. MATLAB and SIMULINK manuals
2. OrCAD/ PROTEUS manual