Shivaji University, Kolhapur
(To be implemented from Academic year 2014-2015)
Revised Syllabus Structure of Second Year Engineering (SE)
Electronics and Telecommunication Engineering

Scheme of Teaching and Examination

Semester-III

Sr. No.	Subject	Teaching Scheme (Hrs.)				Examination Scheme(Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Engineering Mathematics- III	3	1	--	4	100	25	--	--	125
2	Analog Circuits –I	4	--	2	6	100	25	50	--	175
3	Digital Electronics	4	--	2	6	100	25	50	--	175
4	Network Analysis	3	1	--	4	100	25		--	125
5	Transducers & Measurement	4	--	2	6	100	25	--	--	125
6	Programming Languages (C, C++)	2	--	2	4	--	25	50	--	75
		20	**2**	**8**	**30**	**500**	**150**	**150**	--	**800**

Semester- IV

Sr. No.	Subject	Teaching Scheme(Hrs.)				Examination Scheme(Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Analog Circuits -II	4	--	2	6	100	25	50	--	175
2	Linear Integrated Circuits	4	--	2	6	100	25	50	--	175
3	Data Structure	3	--	2	5	100	25	--	--	125
4	Electromagnetic Engineering	4	1	--	5	100	25	--	--	125
5	Analog Communication Systems	4	--	2	6	100	25	50	--	150
6	Circuit Simulation	--	--	2	2	--	25	--	--	--
		19	**1**	**10**	**30**	**500**	**175**	**100**	**25**	**800**

Shivaji University, Kolhapur
Revised Syllabus Structure of Third Year Engineering (TE)
Electronics and Telecommunication Engineering Course
Scheme of Teaching and Examination

Semester-V

Sr. No.	Subject	Teaching Scheme(Hrs.)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Microprocessors & Microcontrollers	4	--	2	6	100	25	50	--	175
2	Control Systems	3	1	--	4	100	25	--	--	125
3	Signals & Systems	3	1	--	4	100	25	--	--	125
4	Power Electronics	4	--	2	6	100	25	--	--	125
5	Digital Communication	4	--	2	6	100	25	50	--	175
6	Simulation LAB	2	-	2	4	--	25	50	--	75
		20	**2**	**08**	**30**	**500**	**150**	**150**	**--**	**800**

Semester-VI

Sr. No.	Subject	Teaching Scheme(Hrs.)				Examination Scheme(Marks)				
		L	T	P	Total	Theory	TW	POE	OE`	Total
1	Digital Signal Processing	4	--	2	6	100	25	--	--	125
2	VLSI Design	3	--	2	5	100	25	50	--	175
3	Antenna Wave Propagation	4	--	2	6	100	25	50	--	175
4	Optical Communication & Network	4	--	2	6	100	25	--	--	125
5	Industrial Management	3	--	--	3	100	25	--	--	125
6	Electronic System Design	2	--	2	4	--	25	--	50	75
		20	**--**	**10**	**30**	**500**	**150**	**100**	**50**	**800**

Note:-Industrial training for 15 days is mandatory during summer vacation (after TE-II) & the assessment of the same will be carried out in project phase-I, By project guide in BE-I

Shivaji University, Kolhapur
Revised Syllabus Structure of Final Year Engineering (BE)
Electronics and Telecommunication Engineering Course
Scheme of Teaching and Examination

Semester-VII

Sr. No.	Subject	Teaching Scheme (Hrs.)				Examination Scheme(Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Satellite Communication	3	1	--	4	100	25	--	--	125
2	Embedded System	4	--	2	6	100	25	50	--	175
3	Computer Communication Networks	4	--	2	6	100	25	--	25	150
4	RF & Microwave Engineering	4	-	2	6	100	25	--	--	125
5	Elective-I	3	1	--	4	100	25	--	--	125
6	Industrial Training	--	--	--	---	--	25*	--	--	25
7	Project Phase-I	--	--	2	2	--	25	--	50	75
		18	**2**	**08**	**28**	**500**	**175**	**50**	**75**	**800**

*** Assessment will be carried out with Project Phase – I By Internal Guide.**

Semester-VIII

Sr. No.	Subject	Teaching Scheme(Hrs.)				Examination Scheme(Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Video Engineering	4	--	2	6	100	25	50	--	175
2	Wireless Mobile Communication	4	--	2	6	100	25	--	--	125
3	Digital Image Processing	4	--	2	6	100	25	--	50	175
4	Elective-II	3	1	--	4	100	25	--	--	125
5	Project Phase - II	--	--	4	4	--	100	100	--	200
		15	**01**	**10**	**26**	**400**	**200**	**150**	**50**	**800**

BE Part-I

Elective-I

1. Robotics
2. Speech processing
3. MEMS
4. Radar & Navigation Aids

BE Part-II

Elective-II

1. Mechatronics
2. Artificial Neural Network
3. Remote Sensing & GPS
4. Operating System

SHIVAJI UNIVERSITY, KOLHAPUR
S.E. (Electronics and Telecommunication) Part- I
w. e. f July 2014
1. Subject: Engineering Mathematics – III

Teaching Scheme	Examination Scheme
Lectures : 3 hrs / week	**Theory :** 100 Marks
Tutorial: 1 hrs / week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	To describe Linear Differential Equation with constant coefficient.
2	To discuss, importance of Fourier series and Fourier Transform in engineering.
3	To introduce Laplace Transform & Inverse Laplace transform and its Application.
4	To explain Z – Transform and Vector differential calculus.

Course Outcomes:

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	An ability to identify, formulates, and solves Linear differential equation with constant coefficient.
2	Understand application of Linear differential equation with constant coefficient which are related to Electrical engineering Systems.
3	Find the solution by Z- Transform.
4	Understand basic of inverse Laplace transform, Periodic & Heaviside function.
5	Knowledge of periodic function, Euler formulae, Fourier series and their different possible forms.

Unit No		No. of Hours
I	**Linear Differential Equations (LDE) and Applications**: Linear Differential Equations with constant coefficients, Cauchy's and Legendre's differential equation, Applications of Linear Differential Equations with constant coefficients to Electrical systems.	**07**
II	**Fourier Series:** Definition, Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, expansions of odd and even periodic functions and Half range series.	**07**
III	**Fourier Transforms:** Fourier Transforms, Fourier Sine and Cosine Transforms, Complex form of Fourier Integral, Finite Fourier Sine and Cosine Transform.	**07**
IV	**Laplace Transform and Applications:** Definition, properties of Laplace transforms, transforms of derivatives, transforms of integral. Inverse Laplace transforms, Convolution theorem. Applications to initial value boundary problems, Heaviside Unit step Function, Dirac-delta function, and Periodic function.	**07**
V	**Z Transform:** Definition, properties of z transform , Z Transform of basic sequences , Z transform of some standard discrete function inverse Z transform	**07**
VI	**Vector Differential Calculus**: Differentiation of vectors, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function. Irrotational and solenoidal vector field.	**07**

Reference Books:

1	Advance Engineering Mathematics, 9e, by Erwin Kreyszig (Wiley India.)
2	Mathematical Methods of Science and Engineering, by Kanti B. Datta (Cengage Learning.)
3	Advanced Engineering Mathematics, 3e, by Jack Goldberg (Oxford University Press.)
4	Engineering Mathematics, 6e, V. Sundaram (Vikas Publication.)
5	Higher Engineering Mathematics, by B. S. Grewal (Khanna Publication Delhi.)
6	Higher Engineering Mathematics, by B. V. Ramana (Tata McGraw-Hill)
7	Advanced Engineering Mathematics, by H. K. Das (S. Chand Publication.)

Note: Any 10 experiments/Tutorials based on above syllabus.

SHIVAJI UNIVERSITY, KOLHAPUR
S.E.(Electronics and Telecommunication) Part- I
w.e.f July 2014
2. Subject : Analog Circuits -I

Teaching Scheme	Examination Scheme
Lectures : 4 hrs / week	**Theory :** 100 Marks
Practical: 2 hrs / week	**TW :** 25 Marks **POE:** 50 Marks

Course Objectives: The course aims to:	
1	Provide an introduction and basic understanding of Semiconductor Devices viz. diodes and bipolar junction transistors.
2	Provide basic analog electronic circuit design techniques using diodes and bipolar junction transistors and to develop analytical skills.
3	Develop student ability to apply basic engineering sciences to understand the operation & analysis of electronic circuits using diodes and bipolar junction transistors.
4	Design electronic circuits to meet the desired specifications.

Course Outcomes:

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Apply knowledge of mathematics, science, and engineering to design, analyze and operation of electronic devices and circuits.
2	Explain basic analog electronic circuit design techniques using diodes and bipolar junction transistors.
3	Explain the hybrid model of transistor and analyze the transistor amplifier (CE, CB, CC) using h-parameters.
4	Analyze and design electronic circuits such as rectifiers, voltage regulators and transistorized amplifiers.

Unit No		No. of Hours
I	**Wave Shaping Circuits:** Low pass & high pass RC circuits (analysis for square ,step, ramp, exponential input), High pass RC circuit as a differentiator, Low pass RC circuit as integrator. Clipping circuits: diode clippers, transistor clippers, Transfer characteristics, Clamping circuits: Classification, clamping operations, Clamping circuit theorem, practical clamping circuits, multistage voltage multipliers. Circuit design is expected.	**09**
II	**Unregulated Power Supplies:** Rectifiers: Half wave, full wave: center tap and bridge type, analysis for different parameters: PIV, TUF, efficiency, ripple factor, regulation, form factor etc. Filters: Need of filters, Types: capacitor, inductor, LC, CLC, Analysis for ripple factor. Design of unregulated power supply with filter using full wave rectifier.	**09**
III	**Voltage Regulators :** Need of voltage regulator, Stabilization factors, Analysis & Design of Shunt regulator (using Zener diode & BJT),emitter follower regulator, series pass voltage regulator (using BJT), Pre- regulator & Overload protection circuit.	**08**

IV	**Voltage Amplifiers:** H-Parameters, Hybrid model for transistor (CE, CB& CC configuration), amplifier equations for Voltage Gain, Current gain, Input resistance & Output resistance taking Rg of source into account.	**06**
V	**Frequency Response of Single Stage RC Coupled Amplifier:** Low frequency response: Effect of emitter bypass capacitor(CE) & Coupling capacitor(CC), Amplifier response to square wave, percentage Sag calculation, (Numerical are expected) High frequency response: Hybrid π model , Derivation for CE short circuit & resistive current gain, β cutoff, α cutoff frequency, approximate amplifier high freq. response to square wave ,gain bandwidth product, (Numerical are expected). Design of single stage RC coupled amplifier.	**09**
VI	**FET & MOSFET:** Basic construction and operation of JFET and MOSFET, parameters of FET, Biasing of JFET, Common source FET amplifier. Design of self biased CS amplifier.	**09**

Books:

Pulse digital and switching circuits	Millman Taub	Tata MCGraw hill 2nd edition
Electronic devices & circuits	Allen Mottershed	Prentice- Hall India
Electronic devices & circuits	J. Millman & C.Halkias	Tata McGraw Hill Publication
Electronic devices & circuits	David A. Bell	Oxford University
Electronic devices & circuits'	S Salivahanan N Sureshkumar	Tata McGraw Hill Publication
Electronic devices & circuit theory	Robert L. Boylsted, Louis Nashelsky	Pearson Education
Electronic Principles	Malvino	
Electronic devices & circuits'	A.K. Maini and Varsha Agarwal	Wiley publications
A Monograph on Electronics DesignPrinciples	N.C. Goyal & R.K. Khetan-	Khanna Publishers
National Semiconductor Data Manual	--	--

List of Experiments(Minimum 10):

1.	Design and study of Low pass filter a.Frequency response (sinusoidal) b. integrator (Square wave input)
2.	Design and study of High pass filter a.Frequency response (sinusoidal) b. Differantiator (Square wave input)
3.	Study of different types of clipper circuits.
4.	Study of different types of clamping circuits.
5.	Design and analysis of full wave rectifier with capacitive filter.
6.	Design and analysis of full wave rectifier with inductive filter.
7.	Design and analysis of zener shunt regulator
8.	Design and analysis of transistorized shunt regulator
9.	Design and analysis of emitter follower regulator
10.	Design and analysis of series pass voltage regulator
11.	Determination of H-parameter for CE configuration using input and output characteristics.

12.	Design and frequency response of single stage RC coupled amplifier.
13.	Calculation of sag and rise time for low and high frequency square wave response of single stage RC amplifier
14.	Calculation of performance parameters using characteristics of JFET.

Note for paper setter: 40% theory and 60% numerical and Design

SHIVAJI UNIVERSITY, KOLHAPUR
S.E.(Electronics and Telecommunication) Part- I
w.e.f July 2014
3. Subject : Digital Electronics

Teaching Scheme	Examination Scheme
Lectures : 4 hrs / week	**Theory :** 100 Marks
Practical : 2 hrs / week	**TW :** 25 Marks **POE:** 50 Marks

Course Educational Objectives(CEOs): The course aims to:	
1	Understand principles, characteristics and operations of combinational & sequential logic circuits.
2	Design combinational circuits by using logic gates, MSI circuits, PLDs.
3	Explain Boolean algebra and the various methods of Boolean function reduction, K-map reduction and Quine McCluskey method
4	To design, implement and analyze, asynchronous and synchronous sequential circuits(FSM) using flip flops.
5	Explain the various 74XX series components and their applications in designing combinational & low complexity sequential circuits.

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
1.	Apply Boolean laws/K-Map-method, Quine McCluskey method to reduce a given Boolean function.
2.	Design & realize combinational logic circuits using logic gates, MSI circuits, PLDs for various practical applications.
3.	Demonstrate the operation of flip-flops, counters and shift registers.
4.	Design Synchronous sequential machine using Moore and Mealy machine
5.	Distinguish between various memories and implementation of digital circuits using PLA
6.	Demonstrate logical skills, debugging skills in designing small digital circuits for industrial applications

Unit No		No. of Hours
I	**Digital CMOS Logic Family** Characteristics of digital ICs-Speed of operation, power dissipation, figure of merit, fan in, fan out, current and voltage parameters, noise immunity, operating temperatures and power supply requirements, comparison of TTL and CMOS logic family characteristics CMOS logic – CMOS inverter, CMOS inverter static and dynamic	**06**

	characteristics, NAND, NOR gates, Implementation of simple Boolean equations using CMOS logic.	
II	**Combinational Logic Circuits** Adder, Subtractor, code converters (binary to gray & gray to binary, BCD to Excess 3 and vice versa, BCD to 7 segment display)(IC 7447, 7448), Multiplexer and Demultiplexer , encoder, priority encoder, decoder, adder with look ahead carry generator, Parallel adder (IC 7483), subtractor using adder, 4 bit Magnitude Comparator (7485), ALU (74181)	**08**
III	**Combinational Logic Optimization and Design** Boolean optimization, K-map optimization**,** Quine McCluskey method, Designs using combinational components.	**10**
IV	**Sequential Logic Circuits** 1 Bit Memory Cell, Latches (SR, JK, D and T), Clocked latches (SR, JK, D and T), flips flop (JK, T and D). Designing FF using latches, Use of preset and clear terminals, Excitation Table for flip flops, and Conversion of flip flops, Timing parameters of FF Application of Flip flops: Registers, Shift registers, Universal Shift Registers, Counters - ripple counters (74190/7490), synchronous counters (74193), Up/down counters, ring counters, Johnson Counter, MOD-N counter	**10**
V	**Synchronous Sequence Machines** FSM, Moore/Mealy machines, representation techniques, state diagram, state table, state assignment and state reduction, implementation using D flip flop, Application like sequence detector, priority resolver, industrial controller etc., Effect of clock skew and clock jitter on synchronous designs (Metastability)	**10**
VI	**Semiconductor Memories and Programmable Logic Devices** Memory devices: ROM, PROM, EPROM, EEPROM, RAM, SRAM, DRAM, NVRAM, Programmable logic devices: PAL and PLA, Implementing combinational and sequential circuits using PLA,	**05**

Text Books:

1	Digital Design - M. Morris Mano - Pearson Education (3rd Edition) (Unit 1,2,3,4)
2	Digital Principles – Leach, Malvino, TMH (6th Edition). (Unit 1,2,3,4)
3	R. P. Jain, "Modern digital electronics", 3rd edition, 12th reprint TMH Publication, 2007. (Unit 1,2,3,4)
4	Digital Design Principles and Application - Wakerly – Pearson Education (Unit 5,6)

Reference Books:

1	Roth Kinney, "Fundamentals of Logic Designs", 6th edition, CENGAGE learning (For Lab Design Problems)
2	Willim I. Fletcher', An Engineering Approach to Digital Design'—PHI/ Pearson

3	A. Anand Kumar, "Fundamentals of digital circuits" 1st edition, PHI publication, 2001 (for question bank)
4	Anil K. Maini, "Digital Electronics principles and Integrated Circuits" Wiley Publications
5	G. K. Kharate, "Digital Electronics", Oxford University Press (Tutorials and practical)
6	S. Shalivahanan, "Digital Circuits and Design", Vikas Publication House
7	Subrata Ghoshal, "Digital Electronics" CENGAGE learning (Tutorials)

List of Experiments:

1.	Prototyping of source to destination communication using MUX (IC 74151) and DEMUX(IC 74138)
2.	BCD adder using IC 7483(extend to BCD subtractor)
3.	Design and build 8 bit magnitude comparator using IC 7485
4.	Design and build 4 bit comparator using IC 74181
5.	Implement and evaluate using oscilloscope Mod-N counter (IC 7490)
6.	Design, Implement and evaluate using oscilloscope 4-bit synchronous counter using IC 7476
7.	Study of all modes of universal shift register using IC 7495(right, left, clockwise, anticlockwise, circular)
8.	Design, implement and test 4 bit sequence detector using IC 7474
9.	Mini Project: Fairly complex application oriented mini-project with digital input and output and appropriate display
10.	Prototyping of source to destination communication using MUX (IC 74151) and DEMUX(IC 74138)

Note:

1. At least 3 Experiments should be design on bread board
2. Mini project should be carried out by group of students not more than 3
3. Mini project should be judged by at least two faculty members for understanding practical skills, written communication skills, team work skills etc.

SHIVAJI UNIVERSITY, KOLHAPUR
S.E.(Electronics and Telecommunication) Part- I
w.e.f July 2014
4. Subject: Network Analysis

Teaching Scheme	Examination Scheme
Lectures : 3 hrs / week	**Theory :** 100 Marks
Tutorial: 1 hrs / week	**TW :** 25 Marks

Course Objectives: The course aims to:	
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:

Course Outcomes: Upon successful completion of this course, the student will be able to:	
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 analyze and formulate network function of a network using pole and zero concepts.
5	Students can apply filter approximations to design analog passive filters.

Unit No		No. of Hours
I	**Network Fundamentals:** Basic Definitions: Passive Network, Active Network, Linear Element, non-linear elements, Unilateral, bilateral, lumped & distributed elements. Representation of voltage & current sources.(Ideal & practical) , source transformation, series & parallel connection of passive elements(R,L,C), graph of network & its parts, loops & trees, linear graphs & incidence matrix, cutsets, planner & non-planner graph loop matrix. Star- Delta transformation, reduction of networks: Mesh analysis, Node analysis. Supermesh and supernode analysis.	**06**
II	**Network Theorems:** D.C. and A.C. network solution using dependent and independent sources: Superposition Theorem, Millman's Theorem, Norton's Theorem, Thevenin's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Duality theorem	**08**

III	**Two Port Network & Network Functions:** Two port network: Open circuit impedance (Z) parameters, Short circuit admittance (Y) parameters, Hybrid (H) parameter, Transmission parameters(ABCD), Interrelation of different parameters, Interconnections of two port network (Series, Parallel, Cascaded, Series- Parallel) Network Functions: Network functions for one port & two port networks, Driving point impedance and admittance of one port network, Driving point impedance, admittance & different transfer function of two port network (Z,Y,H & T parameters). Concept of complex frequency, significance of poles & zeros. Restrictions on poles & zeros for transfer & drawing points function, stability concept in passive circuit using Routh-Hurwitz criterion, pole zero diagram.	**07**
IV	**Resonance :** Defination , Types: series & parallel resonance. Series resonance- resonant frequency, variation of impedance, admittance, current & voltage across L & C with respect to. frequency, Effect of resistance on frequency response, Selectivity , B.W.& Quality factor. Parallel resonance – Anti resonance frequency, variation of impedance & admittance with frequency, . Selectivity & B.W.	**06**
V	**Filters** Definitions, classification & characteristics of different filters, filter fundamental such as attenuation constant (O) , phase shift (N) propagation constant (S) characteristic impedance (Zo) , decibel ,neper. Design & analysis of constant K, M derived & composite filters (low pass, high pass, band pass & band stop filters): T & Pi sections.	**06**
VI	**Transient Response:** Network Solution using Laplace transforms, Initial Conditions of elements. Steady state & transient response (Voltage & Current) DC response of RL circuit DC response of RC circuit DC response of RLC circuit Sinusoidal response of RL, RC & RLC circuit	**07**

Text Books:

1	A. Sudhakar ,Shyammohan S.Palli 'Circuit & Network – Analysis & Synthesis' IIIrd Edition – Tata McGraw Hill Publication (Unit II,IV,VI)
2	A.Chakrabarti 'Circuit Theory (Analysis & Synthesis)' - IIIrd Edition (Unit I,II) Dhanpat Rai & co
3	D. Roy Choudhury 'Networks & Systems' - New Age International Publisher (Unit I,II,III)
4	Soni Gupta 'Electrical Circuit Analysis' Dhanpat Rai & Co. (Unit III,IV,V,VI)
5	Boylestad 'Introductory Circuit Analysis – Universal book stall, New Delhi.(Unit I,II)

Reference Books:

1	William H Hayt, Jack E Kimmerly and Steven M.Durbin, Engineering Circuit Analysis, Tata McGraw Hill
2	M.E.Van Valkenburg ' Network Analysis' – IIIrd Edition , Pearson Education / PHI
3	Josheph Edministrar 'Theory & Problems of Electronic Circuit (Schaum's series) – Tata McGraw Hill, Publication
4	R.G .Kaduskar, S.O.Rajankar, T.S. Khatavkar, Network Fundamentals and Analysis –

	Wiley India

Minimum 08 Tutorials based on above Topics
Note for Paper setter: 40% theory and 60% numerical are expected

Term Work: (Minimum 10 tutorials):
Minimum 10 tutorials based on above syllabus covering all units.

SHIVAJI UNIVERSITY, KOLHAPUR
S.E.(Electronics and Telecommunication) Part- I
w.e.f July 2014
5. Subject: Transducers and Measurements

Teaching Scheme	Examination Scheme
Lectures : 4 hrs / week	**Theory :** 100 Marks
Practical: 2 hrs / week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	Provide introduction to different types of Transducers & sensors with their classification, principle, construction & application
2	Provide knowledge of different parts of Measurement system such as Signal Conditioning & Data Acquisition System along with Transducer
3	Design of Instrumentation system to meet desired specifications
4	Provide basic knowledge of measurement system
5	Provide basic understanding of different Electronic instruments
6	Provide knowledge of different types of bridges

Course Outcomes:

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Student will able to select appropriate transducer as per required.
2	Students will get acquainted with different DAS
3	Student will be able to design instrumentation system
4	Student will able to understand measurement basics and select proper instrument proper particular measurement of electrical parameters.

Unit No		No. of Hours
I	**Transducers & Sensors:** Definition, Various Types of Transducers, Classification of Transducers, Selection Factors and General Applications of Transducers, Detailed Study of Transducers: (i) Motion, (ii) Flow, (iii) Pressure, (iv) Temperature, (v) Force and Torque, (vi) Sound Transducer, Hall Effect Transducers, Digital Transducers, Proximity Devices, optical Sensors, Smart Sensors, Piezo – electric sensors	**10**
II	**Signal Conditioning & Data Acquisition System:** Introduction, AC & DC Signal Conditioning, Chopper Stabilized Amplifier, Instrumentation Amplifier, Isolation And Programmable Gain	**09**

	Amplifier, Grounding And Shielding, Concept of Active Filters, Practical Comparators, Modulators, Demodulators, Sine And Other Waveform Generation, Principles and working of different types of ADC and DAC	
III	**Instrumentation Techniques:** Introduction to Process Instrumentation, Instrumentation set up for measurement of non electrical quantity such as weight using strain gauge.	**06**
IV	**Introduction to Measurement:** Introduction, Performance Characteristics, Static Characteristics, Error in Measurement, Types of Static Error, Sources of Error, Dynamic Characteristics, Statistical Analysis, Electrical Standards, Atomic Frequency and Time Standards, Graphical Representation of Measurements as a Distribution, Digital voltmeters- Introduction, Types of DVM , general specifications of DVM, digital multimeter, digital measurements of time, digital frequency meter , Q meter, Instrument calibration	**10**
V	**Measurement & Display Devices:** CRO: Dual Beam, Dual Trace, sampling, Digital storage, measurement of phase and frequency using Lissajous pattern, CRO probes: active, passive, current, attenuators, LED, LCD, Graphics Display, Signal Generators, Function generators. Spectrum analyzer, logic analyzer	**09**
VI	**Bridges:** Measurement of Resistance with Bridges, Wheatstone's Bridge, Kelvin Double Bridge, AC Bridges such as Haye's Bridge, Wein Bridge, Maxwell's-Wein Bridge, Maxwell' L/C Bridge, Descourty's Bridge & Schering Bridge	**06**

Text Books:

1	A course in Electrical, Electronics measurement and Instrumentation, A.K.Sawhney
2	Electronic Instrumentation, H. S. Kalsi, MGH, 3rd Edition

Reference Books:

1	Electronic Instrumentation and Measurement Techniques, Welfrick Cooper.
2	InstrumeIntation for Engineers And Scientists , John Turner ,II Edition , Wiley
3	Electronic Instrumentation and Measurements, David A Bell, Third Edition, Oxford
4	Instrumentation for Engineering Measurements, James W Dally, II Edition , Wiley

List of Experiments:

1.	Study of weight measurement using strain gauge
2.	Study of displacement measurement using LVDT.
3.	Study of temperature measurement using RTD PT100/Thermistor/Thermocouple
4.	Study of temperature measurement using IC based sensor LM35.
5.	Study of speed measurement using optical pick up.
6.	Study of measurement of Flow
7.	Study of position measurement using synchro transmitter – receiver.
8.	Study of cathode ray oscilloscope & Measurement of amplitude and frequency using CRO
9.	Measurement of phase and frequency by lissajous pattern using CRO.
10.	Study of function generator
11.	Study of of spectrum analyzer
12.	Study of Logic analyzer
13.	Study of AC bridges

14.	Study of DC briges

Note: Any 10 experiments/Tutorials based on above syllabus.

S.E.(Electronics and Telecommunication) Part- I
w.e.f July 2014
6. Subject: Programming Languages (C,C++)

Teaching Scheme	Examination Scheme
Lectures : 2 hrs / week	**Theory :** ----
Practical: 2 hrs / week	**TW :** 25 Marks **POE :** 50 Marks

Course Objectives: The course aims to:	
	This course provides students with a comprehensive study of the C programming language. Programming topics include control structures, functions and arrays. And the objective of this course is to learn fundamentals of C and object oriented concepts and build object oriented programming application using C++. Its main objective is to teach the basic concepts and techniques which forms the **programming platform.**

Course Outcomes:

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Understand the basic programming concepts.
2	Understand the use of arrays to store lists and tables of values.
3	Understand the close relationships among arrays and strings.
4	Understand how a good program design can reduce coding and debugging time.
5	Explain the features of object oriented programming such as objects, classes, user defined data types, enumerations, constructors, destructors, overloading, inheritance polymorphism etc.
6	Design, implement, test, and debug simple programs in an object-oriented programming language.
7	Demonstrate good programming skills.

Unit No		No. of Hours
I	**Introduction to Procedure Oriented Programming Language** Introduction, Constants, Variables, Data types, Operators and Expressions, Decision Control statements, Loop control statements	**04**
II	**Functions and Pointers**: **Functions** -Introduction to function, passing values between functions, scope rules of function, calling convention, advanced features of function-return type of function,call by value & call by reference, recursion **Pointers-**Introduction to pointers, pointer notation	**04**
III	**Arrays and Structures :** **Arrays** -Introduction, Declaration and Initialization of array, types of arrays-two dimensional array, multi dimensional array **Structures-**Introduction, declaring structure, accessing structure elements, array of structures, additional features & uses of structure.	**05**

IV	**Introduction to Object oriented programming language** Introduction to basic concepts of object oriented programming language, classes & objects, defining member function, making an outside function inline, Nesting member function, private member function, Arrays within a class, memory allocation for objects, dynamic memory allocation(*new, delete*), Array of objects, pointer to members. Pointers to objects this Pointer.	**05**
V	**Constructors and Destructors** Introduction, Constructors, types of constructors-default constructor, copy constructor, parameterized constructor, destructors, importance of destructors.	**03**
VI	**Polymorphism & Inheritance:** **Polymorphism** –Introduction, Function overloading, Unary & binary operator overloading, manipulation of strings using operators. Friend function & friend class. **Inheritance** –Introduction, types of inheritance-single, multiple, multilevel, hybrid, hierarchical inheritance, virtual base classes	**05**

Text Books:

1	Yashwant Kanetkar-'Let Us C'-,8th edition-BPB Publications.
2	Pradip Dey,Manas Ghosh-'Programming in C'-II edition-OXFORD University Press
3	E Balgurusamy –'Object oriented programming with C++' -, IIIrd Edition- Tata Mc-Graw Hill Publication
4	Rajesh K.Shukla-'Object – Oriented Programming in C++'WILEY-INDIA

Reference Books:

1	E Balgurusamy –'Programming in ANSI C' -, Vth Edition- Tata Mc- Graw Hill Publication
2	Brian W. Kernighan ,Dennis M. Ritchie-'The C Programming Language' –IInd Edition-Prentice Hall of india
3	Herbert Schildt –'The Complete Reference C++' - IIIrd Edition - Tata McGraw Hill Publication
4	D Ravichandran.-'Programming with C++ '-IInd Edition- Tata McGraw Hill Publication
5	Rohit Khurana-'Object oriented programming with C++'-second edition-Vikas publication
6	Sourav Sahay-'Object oriented programming with C++'-second edition-OXFORD university press

List of Experiments:

1. Develop a Program for implementation of decision control statements
    a. If……
    b. If ……. Else
2. Develop a Program for implementation of loop control statements
    a. For….
    b. Do…while…
    c. While….
    d. Switch case
3. Develop a Program for implementation of functions
    a. Call by value
    b. Call by reference
4. Develop a Program for implementation of pointer
5. Develop a Program for implementation of array
    a. One-dimensional array
    b. Multi-dimensional array
6. Develop a Program for implementation of structures
7. Develop a Program for implementation of classes and Objects.
8. Develop a Program for implementation of pointers to Objects.
9. Develop a Program for implementation of types of constructor
    a. Default constructor
    b. Parameterized constructor
    c. Copy constructor
10. Develop a Program for implementation of polymorphism
11. Develop a Program for implementation of Friend Functions in Class
12. Develop a Program for implementation of types of inheritance
    a. Single level Inheritance
    b. Multi level Inheritance
    c. Multiple Inheritance
    d. Hybrid Inheritance
    e. Hierarchical inheritance

Note: Any 10 experiments/Tutorials based on above syllabus

SHIVAJI UNIVERSITY, KOLHAPUR
S.E.(Electronics and Telecommunication) Part- II
w.e.f July 2014
1. Subject : Analog Circuits -II

Teaching Scheme	Examination Scheme
Lectures : 4 hrs / week	**Theory :** 100 Marks
Practical: 2 hrs / week	**TW :** 25 Marks **POE:** 50 Marks

Course Objectives: The course aims to:	
1	Provide an introduction and basic understanding feedback amplifiers, power amplifiers, oscillators, multivibrators
2	Develop student ability to apply basic engineering sciences to understand the operation & analysis of electronic circuits using diodes, bipolar junction transistors and field effect transistors
3	Provide analog electronic circuit design techniques using diodes, bipolar junction transistors and field effect transistors, and to develop analytical skills.
4	Design electronic circuits to meet desired specifications.
5	Apply knowledge of mathematics, science, and engineering to design, analyze and operation of electronic circuits.

Course Outcomes:

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Explain basic analog electronic circuit design techniques using diodes, bipolar junction transistors and field effect transistors.
2	Analyze and design electronic circuits such as wave shaping circuits, multistage amplifiers, power amplifiers.
3	Describe and design different types of oscillators and multivibrators as per given specifications and requirement using bipolar junction transistors and field effect transistors.
4	Demonstrate the analytical skills developed while designing the electronic circuits using diodes, bipolar junction transistors and field effect transistors.

Unit No		No. of Hours
I	**Multistage Amplifiers** **N**eed of cascading, Parameter evaluation such as Ri ,Ro, Av, Ai & bandwidth for general multistage amplifier, Design of two stage RC coupled, Direct coupled amplifier using BJT.	**08**

II	**Feedback Amplifiers :** General theory of feedback, reasons for negative feedback. Types of negative feedback in transistor circuits: Voltage series, Current series, Voltage shunt, Current shunt feedback amplifiers, Darlington pair, Darlington amplifier using bootstrapping principle, (Numerical are expected) Design of Voltage series feedback amplifier	**09**
III	**Power Amplifiers:** Need of Power amplifier, classification of power amplifier, Power considerations, Distortion in power amplifiers: Phase, Frequency, amplitude/ harmonic / non linear distortion, amplitude distortion using Three point method. analysis and design of Class A single ended transformer coupled amplifier& class A Push pull amplifiers, Class B amplifier & class B push pull amplifier , crossover distortion, class AB Push pull amplifiers. Complementary symmetry power amplifier.	**09**
IV	**Oscillators:** Barkhausen's criteria , Frequency and amplitude stability, Classification, RC oscillators : RC phase shift & Wein bridge oscillator analysis & design using BJT & FET , LC oscillators: Colpit's & Hartely's oscillators analysis and design using BJT, Crystal oscillator.	**09**
V	**Multivibrators :** Transistor as a switch, Different transistor switching parameters, overdrive factor, classification of multivibrators, Analysis and design of collector coupled -Astable, Monostable, fixed bias and self bias Bistable multivibrator and Schmitt trigger using BJT considering overdrive factor. Triggering circuits for Multivibrators	**09**
VI	**IC voltage regulator** Study and design of regulators using IC's :78XX, 79XX,LM723,LM317 Switching regulator LM3524	**06**

Books:

Electronic devices & circuits	Allen Mottershed	Prentice- Hall India
Pulse digital and switching circuits	Millman Taub	Tata McGraw Hill
A Monograph on Electronics DesignPrinciples	N.C. Goyal & R.K. Khetan-	Khanna Publishers
Electronic devices & circuits	David A. Bell	Prentice- Hall India
Electronic devices & circuits	G. K. Mittal	
Electronic devices & circuit theory	Robert L. Boylsted, Louis Nashelsky	Pearson Education
Electronic devices & circuits'	A.K. Maini and Varsha Agarwal	Wiley publications
Electronic devices & circuits'	S Salivahanan N Sureshkumar	Tata McGraw Hill Publication
Microelectronics Circuits	Sedra smith	Oxford International student

		edition
National Semiconductor Data Manual	--	--

Note for paper setter: 40% theory and 60% numerical and Design

List of Experiments(Minimum 10):

1.	Design and frequency response of direct coupled amplifier.
2.	Design and frequency response of two stage RC coupled amplifier.
3.	Design and frequency response of voltage series feedback amplifier.
4.	Design of transformer coupled class A amplifier.
5.	Design of RC phase shift oscillator using BJT
6.	Design of wein bridge oscillator using BJT
7.	Design of colpitts oscillator using BJT
8.	Design of hartley oscillator using BJT
9.	Design of Astable multivibrator
10.	Design of monostable multivibrator using BJT
11.	Design of bistable multivibrator using BJT
12.	Design of Schmitt trigger using BJT
13.	Design of voltage regulator using LM317
14.	Design of voltage regulator using IC723

Note: Any 10 experiments/Tutorials based on above syllabus.

SHIVAJI UNIVERSITY, KOLHAPUR
S.E.(Electronics and Telecommunication) Part- II
w.e.f July 2014
2. Subject : Linear Integrated Circuits

Teaching Scheme	Examination Scheme
Lectures : 4 hrs / week	**Theory :** 100 Marks
Practical: 2 hrs / week	**TW :** 25 Marks **POE:** 50 Marks

Course Objectives: The course aims to:	
1	Explain the internal circuit of operational amplifier and its electrical parameters.
2	Indicate the importance of an Op-amp in building an analog computer.
3	Explain the application of Op-amps in building signal conditioning circuits, filters, waveform generators etc.
4	Develop practical skills for building and testing circuits using analog ICs.

Course Outcomes:

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Select an appropriate Op-amp for a particular application by referring data sheets.
2	Design Op-amp based circuit to give specified gain.
3	Explain the frequency response characteristics of an amplifier using Op-amp.
4	Compute component values to design different Op-amp based circuits which include arithmetic building blocks, filters, waveform generators etc.
5	Solve numerical problems related to op-amp circuits.
6	Explain the working of various circuits for different applications designed using linear integrated circuits such as IC 741,IC555, IC565,IC566, CA3140and IC177, IC620
7	Demonstrate circuit design skills using analog ICs.

Unit No		No. of Hours
I	**Introduction to op-amp** Definition, symbol, Block diagram of OP-AMP, Explanations of each block, Differential Amplifier configurations, Differential amplifier analysis (AC & DC) for dual-input balanced-output configuration using 'r' parameters, level shifter, current mirror circuits, ideal parameters and practical parameters of OP-AMP and their comparison, internal circuit of IC741, detail circuit analysis of IC CA3140.	**09**
II	**Op-amp configurations & frequency response:** Virtual ground concept, Open loop configuration, closed loop configuration, unity gain amplifier, frequency Response of both configurations, Stability considerations, Frequency Compensation, Slew Rate.	**07**
III	**Applications of Op-amp** Summing, Scaling & Averaging Amplifiers using Op-amps, Differential amplifier using op-amp, Subtractor Circuit, Instrumentation amplifier, V to I & I to V Converter, Precision Rectifiers, Log & Anti-log Amplifiers, Study of comparator, Schmitt Trigger, Window Detector, Clippers & Clampers, Peak Detectors, Sample & Hold Circuits.	**09**

IV	**Active Filters** Introduction, Analysis & Design of Butterworth filters: High Pass filter, Low Pass filter (First & Second order), Band Pass filter, Band Reject filter, All Pass Filter, Introduction to Chebyshev Filter.	**09**
V	**Waveform Generators** Analysis & Design of Square wave generator, Triangular wave generator, Sawtooth wave generator. Analysis & Design of RC phase shift oscillator, RC wein bridge oscillator, Colpitts oscillator, Hartley oscillator.	**09**
VI	**Special purpose ICs** IC 555 Timer: Block Diagram, Operating Principle, Multi-vibrator using IC 555. IC 565 PLL: Operating Principles, applications, Introduction of (block diagram, features, application areas) : IC OP177 op-amp,IC AD620 instrumentation amplifier	**06**

Text Books:

1	Ramakant A. Gaikwad, "Op Amps and Linear Integrated Circuits", Pearson Education second and latest edition.

Reference Books:

1	Robert Coughlin, Fredric Driscoll, "Operational Amplifiers and Linear Integrated Circuits", Sixth edition,PE, 2006. (Ch-6)
2	David Bell, "Operational Amplifiers and Linear ICs",Third ed, Oxford University Press
3	B. Somanathan Nair, " Linear Integrated Circuits- Analysis, Design & Applications", Wiley India.
4	Datasheets

List of Experiments:
(Minimum 12 experiments should be conducted out of which maximum 2 can be simulation based)

1. Measure op-amp parameters and compare with the specifications.
   (a) Measure input bias current, input offset current and input offset voltage.
   (b) Measure slew rate (LM/UA741C and LF356)
   (c) Measure CMRR
   (d) Compare the result with datasheet of corresponding Op Amp.
2. Design of inverting , noninvertion amplifier & their frequency response
3. Design of Summing, scaling, and averaging amplifier.
4. Design of V to I convertor
5. Design, build and test differentiator and integrator
6. Design, build and test precision half & full wave rectifier.
7. Design, build and test Comparator and Schmitt trigger.
8. Design, build and test Sample and hold circuit
9. Design of Butterworth filters
10. Design, build and test PLL and any one application.
    a) Study PLL IC 565.
    b) Find the free running frequency.
    c) Find lock range and capture range.
11. Design, build and test square & triangular wave generator.
12. Design of astable & monostable multivibrators using IC555
13. Design and implement Wien bridge oscillator using Op-Amp.

14. An application of AD620 instrumentation amplifier.
15. Design, build and test window detector.

Note: Any 10 experiments/Tutorials based on above syllabus.

SHIVAJI UNIVERSITY, KOLHAPUR
S.E.(Electronics and Telecommunication) Part- II
w.e.f July 2014
Subject : Data Structures

Teaching Scheme	Examination Scheme
Lectures : 3 hrs / week	**Theory :** 100 Marks
Practical: 2 hrs / week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	Provide an introduction and basic understanding of Types of Memory data Allocations i.e Data Stucture
2	Provide basic Knowledge on Algorithms of Operation performed on Linear and Non Linear Data Structure
3	Provide basic Programming Knowledge of Data Structure with C& C++
4	Provides the Knowledge of Different Hash Function

Course Outcomes:

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Apply knowledge of Programming in the Field of Linear and Non Linear data Structure.
2	Perform the Programs of data Structure using C & C++
3	Logic Development To Design an algorithm form Operation on Linear and Non Linear data Structure.
4	Understand The Concept of Hash Function.

Unit No		No. of Hours
I	**Introduction & Overview:** Introduction to theory of data structures & its data types, Algorithms: complexity, time space trade-off with example.	**02**
II	**Arrays, Records & Pointers:** Introduction, linear arrays, representation of linear array in memory, traversing linear arrays, inserting & deleting, Sorting: bubble sort, searching: linear search, binary search, Multidimensional arrays, Pointers: pointer arrays, Records: Record structures, representation of records in	**07**

	memory, parallel arrays, matrices, space matrices.	
III	**Linked Lists:** Introduction, linked lists & its representation, Traversing & searching a linked list, memory allocation, Garbage collection, insertion & deletion of nodes of linked list, header linked list, two-way lists, programming problems.	**06**
IV	**Stacks & Queues:** Introduction to stacks, stack as an Abstract Data type , representation through Arrays & linked lists , Applications of stacks , stacks & recursion, Queue as an abstract data type representation, cicular, double ended, priority, application of queues	**07**
V	**Trees :** Binary Tree: introduction, types, definition, properties, representations, operations, binary tree traversal reconstruction, counting number of binary trees, applications. Advanced trees : AVL trees or height balanced trees, representation operation, Threaded binary trees, Expression trees. Multiway trees: trees , multiway search trees, B+ trees, Heaps, construction of a Heap.	**08**
VI	**Graphs:** Introduction, Graph theory terminology, sequential representation of graphs: Adjacency Matrix, Path matrix, Warshall's Algorithm, shortest paths, linked representation. Operations, Traversing, Posets, Topological sorting	**07**
VII	**Hashing**: Hashing, Hash functions, collision, chaining	**03**

Books:

–'Data structure using C	ISRD group	Tata McGraw Hill
Data structures	Seymour Lipschautz	Tata McGraw Hil
Data structure using C & C++	Langsam, Rubenstein, Tenenbaun	PHI
Data structure & algorithm analysis in C	Mark Allen Weiss	Pearson Education (LPE)
Data Structures & Algorithms in C++	M.T. Goodrich, R. Tamassia, D. Mount	Wiley Publication
Introduction to Data structures in C	A.N. Kathie	Pearson Education (LPE)

List of Experiments(Minimum 10):

1.	Program to Insert the Number in an Array
2.	Program to Delete the Number in an Array
3.	Program on Bubble Sort
4.	Program to Perform Linear search
5.	Program to Perform Binary search
6.	Program To Display 2D Array
7.	Program to Insert the Node in Link List
8.	Program to Delete the Node in Link List

9.	Program to Perform Push and Pop Operation on Stack
10.	Program to Perform Operation on Queue
11.	To Study Properties of Binary tree
12.	To Study Traversing operation of Tree
13.	To Study Traversing operation of Graph
14.	To study Hash Function

SHIVAJI UNIVERSITY, KOLHAPUR
S.E.(Electronics and Telecommunication) Part- II
w.e.f July 2014
4. Subject: Electromagnetic Engineering

Teaching Scheme	Examination Scheme
Lectures : 4 hrs / week	**Theory :** 100 Marks
Tutorial: 1 hrs / week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	Provide fundamentals of Static Electromagnetic Fields.
2	Explain basics of the vector Differential, Integral operators to Electromagnetic theory & Electrostatic & Electromagnetic fields.
3	Define and derive different laws in Electrostatic & Electromagnetic fields.
4	Explain Maxwell's equations and concepts of transmission lines.
5	Analyze techniques for formulating and solving problems in Electrostatic & Electromagnetic fields.
6	Develop mathematical skills related with differential, integral and vector calculus.

Course Outcomes:

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Comprehend the fundamentals of Electrostatic and Electromagnetic fields.
2	Apply Gauss' law, Ampere's Law, Biot-Savart law, Faraday's law and laws related with steady magnetic field while solving problems in Electrostatic and Electromagnetic fields.
3	Develop field equations from understanding of Maxwell's Equations.
4	Extend the knowledge of basic properties of transmission lines to analyze electromagnetic wave propagation in generic transmission line geometries.
5	Demonstrate mathematical skills related with differential, integral and vector calculus.

Unit No		No. of Hours
I	**Co-ordinate systems**: Vector Algebra, Co-ordinate systems, Curl, Divergence & Gradient, Stoke's Theorem, Poisson's and Laplace Equations, Coulomb's law, line, Surface & Volume Charge distribution, uniqueness theorem.	**08**
II	**Electrostatic Fields:** Electric Field Intensity, Electric Field due to infinite line and surface charges, Electric Flux Density, Gauss law (differential and integral form) and its applications, Divergence Theorem, Electric Potential and gradient. Work done, Energy Density, Electric Dipole and moment	**09**

III	**Dielectrics & Boundary conditions:** Polarisation in Dielectrics, Boundary conditions for Dielectric and Dielectric, Conductor and Dielectric, Conductor and free space. Method of Images for point and line charge. Capacitance – parallel, co-axial and spherical. Continuity equation.	**09**
IV	**Magnetostatic Fields:** Biot savart law, Magnetic Field Intensity due to infinite and finite line. Ampere's Circuital Law in integral and differential form, Magnetic flux density, Magnetic boundary conditions, vector magnetic potential, Magnetic Torque, moment and dipole.	**08**
V	**Wave Propagation:** Maxwell's Equations in point form & Integral form for various fields, Wave equations, wave propagation through different medium, skin depth, Poynting theorem, Reflection of plane wave.	**08**
VI	**Transmission Lines:** Transmission Line equations, Characteristic equation of infinite Transmission Line, Uniform terminated Transmission Line, Input impedance, Phase velocity and group velocity, Short circuited and open circuited line, Reflection coefficient VSWR, smith chart (Numerical expected) and applications.	**08**

Text Books:

1	*Engineering Electromagnetics* - William .H. Hayt and J A Buck – 7th Edition – 2011.
2	*Principles of Electromagnetics* - Matthew N O. Sadiku – 4th Edition, Oxford publication 2009.
3	*Electromagnetic Field Theory and Transmission Lines* – Gottapu Sasibhushana rao – Wiley India 2013.

Reference Books:

1	*Electromagnetic Field Theory*- Rakhesh Singh Kshetrimayum – Cengage Publishing – 2012.
2	*Electromagnetic with applications* - J.D. Kraus. (MGH Publications)- 4th Edition.
3	*Fundamentals of Engineering Elecromagnetics* – Sunil Bhooshan – Oxford University press. 2012.
4	*Elements of Electromagnetic fields* - Surinder P.Seth (Dhanpat Rai Publications)

Minimum 08 Tutorials based on above Topics
Note for Paper setter: 50% Theory & 50% Problems are expected

SHIVAJI UNIVERSITY, KOLHAPUR
S.E.(Electronics and Telecommunication) Part- II
w.e.f July 2014
5. Subject : Analog Communication Systems

Teaching Scheme	Examination Scheme
Lectures : 4 hrs / week	**Theory :** 100 Marks
Practical: 2 hrs / week	**TW :** 25 Marks **POE:** 50 Marks

Course Objectives: The course aims to:	
	The basic objective of this course is to introduce the students with analog communication, AM, FM modulation techniques, their analysis, bandwidth calculations. It also focuses on the performance analysis of analog communications systems under the presence of noise and finally introduces the pulse and digital modulation techniques.

Course Outcomes:

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Understand and identify the fundamental concepts and various components of analog communication systems.
2	Understand, analyze and explain various analog modulation schemes.
3	Understand the performance of analog communications systems under the presence of noise.
4	Develop the ability to compare and contrast the strengths and weaknesses of various communication systems
5	Analyze Basic communications systems and their performance under the presence of noise
6	Differentiate between various pulse modulation techniques

Unit No		No. of Hours
I	**Amplitude Modulation:** Elements of electronic communication systems, Need for modulation, channel, frequency spectrum, time and frequency domain signals, Amplitude Modulation principles, AM envelope, frequency spectrum & BW, phase representation of AM wave, Modulation index, % modulation, AM modulating circuits: Low level AM modulation, medium power AM modulation, AM transmitters: Block of low level DSBFC, High level DSBFC, Trapezoidal patterns Evolution and descriptions of SSB, Suppression of carrier using balanced modulator, Suppression of unwanted sideband, Methods: Filter system, phase shift & third method Vestigial sideband(VSB)	**09**
II	**Angle Modulation:** Instantaneous frequency, Concept of angle modulation, frequency spectrum, Narrow band & Wide Band FM, Modulation Index, Bandwidth, Phase modulation, Bessel,s Function and it,s mathematical Analysis, Generation of FM (Direct and Indirect Method), Comparison of FM and	**08**

	PM.	
III	**AM Receiver:** Simplified block diagram of AM receiver, receiver parameters: Sensitivity, Selectivity, BW, dynamic range, Tracking, fidelity, Types of AM receiver: TRF and super heterodyne (block diagram), AM detection types: using diode, practical diode detector, distortion in diode detector. Negative peak clipping & diagonal clipping, Demodulation of SSB using : product demodulator & diode balanced modulator, Automatic Gain Control (AGC).	**08**
IV	**FM Receiver:** Double conversion FM receivers, block diagram, FM demodulator, tuned circuit frequency discriminators, slope detectors, fosters seeley discriminator, ratio detectors, PLL-FM demodulators, FM noise suppression	**08**
V	**Noise:** Sources of noise, Types of noise White noise, shot noise, thermal noise, partition noise, low frequency or flicker noise, burst noise, avalanche noise, signal to noise ratio, SNR of tandem connection. Noise Figure, Noise Temperature, FRISS formula for noise figure, Noise bandwidth	**08**
VI	**Pulse Modulation :** Introduction, Sampling theorem: Occurance of allising error, Mathematical proof of sampling thm., PAM: Channel BW for PAM, Natural Sampling, Flat-top Sampling, PAM & TDM, Signal Recovery,; PWM: Uses of PWM, Genration of Analog W/F using PWM, PPM: Generation of PAM, Generation of PWM, Generation of PPM; PCM Basics, PCM Transmitter and Receiver, Quantization	**09**

Text Books:

1	George Kennedy, "Electronic Communications", McGraw Hill Kennedy.
2	Wayne Tomasi 'Electronics Communication System' -Fundamentals through Advanced.- Vth Edition- Pearson Education.
3	V. Chandra Sekar, "Analog Communication", OXFORD University press.

Reference Books:

1	B.P. Lathi, "Analog and Digital Communication", OXFORD University press.
2	Simon Haykin, "An introduction to analog & digital communications", John Wiley & Sons
3	R P Singh, S D Sapre 'Communication System-Analog & Digital' IInd Edition –Tata Mc Graw Hill Publication
4	Blake"Electronic Communication Systems",2nd Edition CENGAGE learning
5	Louis E. Frenzel, "Principals of electronic communication system", IIIrd Ed., TMH Pub

List of Experiments (Minimum 10)

1. Practical implementation of Amplitude modulation and demodulation.
2. Calculation of modulation index by graphical method of DSBFC signal & measurement of power of AM wave for different modulating signal.
3. SSB modulation using any method (filter method, Phase shift method) and its detection.
4. Envelope detector- Practical diode detector.
5. Performance and analysis of AM system using trapezoidal method
6. Performance and analysis of frequency modulator system and also find the modulation index.
7. Experiment on Sampling and reconstruction and also observe aliasing effect by varying sampling frequency.
8. Practical implementation of PAM system
9. Practical implementation of PPM system
10. Practical implementation of PWM system
11. Practical implementation of PAM-TDM systems.
12. Experiment on Pre-emphasis and De-emphasis.
13. Visit to AIR.

Note: 1.There should be compulsory one industrial visit related to this subject.
2.At least one experiment based on simulation software.

(Question Paper should include 70% theory and 30% numerical.)

SHIVAJI UNIVERSITY, KOLHAPUR
S.E.(Electronics and Telecommunication) Part- II
w.e.f July 2014
6. Subject: Circuit Simulation

Teaching Scheme	Examination Scheme
Lectures : ---- hrs / week	**Theory :** -----
Practical: 2 hrs / week	**TW :** 25 Marks

Course Objectives: The course aims to:	
1	Provide an introduction to P-Spice & simulation software tools (like OrCAD / Proteus, MultiSim).
2	Develop the ability to analyze electronic circuits using simulation software for their AC & DC analysis.
3	Develop skills to design PCB as per required specification.

Course Outcomes:

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Analyze components associated with modelling and simulation of electronic systems.
2	Demonstrate proficiency in the use of appropriate equipment and devices for simulation of electronic circuit.
3	Analyze electronics devices and circuits using computer simulations.
4	Design/model and troubleshoot of electronic systems.
5	Generate a feasible and efficient PCB layout of the given circuit using software.

Unit No		No. of Hours

	SECTION-I	
I	**Schematic Design:** Introduction, Description of P-Spice, Types of analysis, Description of simulation software tools (like OrCAD / Proteus), Schematic Description: Introduction, Input files, element values, Nodes, circuit elements, sources, output variables, format of circuit and output files, drawing the schematic, Design rule Check (DRC), Netlist details.	**04**
II	**Simulation:** Types of Analysis: Bias point, Time domain, AC Sweep, DC Sweep, Parametric, Monte Carlo, Noise analysis. Cover vertical devices also using Multisim, ORCAD, Proteous, OSCAD	**04**
III	**PCB Design:** IC packages, Types of Connectors, Netlist for layout, Types of PCB's, Description of layout design tool, foot- print creation, Setting board parameter (board template, layer strategies), Component placement considerations, Routing strategies, Design Rule check, back annotation, post processing reports. Software: Express PCB	**04**

Text Books:

1.	M. H. Rashid 'Introduction to P-spice using OrCAD for circuits and Electronics' – Pearson Education
2.	Mike Tooley 'Electronic Circuits-Fundamentals and Applications' 3rd Edition – Vikas Publication (Routledge)

Reference Books:

1.	User manuals of PROTEUS, OrCAD, Multisim
2.	User manuals of OSCAD, Express PCB from IIT, Pawai

List of Experiment (Minimum 10)

- 30% experiments on Analog Electronics/Linear Integrated Circuit
- 30% experiments on Digital Electronics
- 30% experiments on Network Analysis
- 10% experiments on Transducer & Measurement

S.E.(Electronics & Telecommunication)

Comparison of Old and Revised Structure
of S.E Electronics & Telecommunication
(Effective from 2014-2015)

Sr No.	OLD Structure	Revised Structure
01	Maths-III	Maths-III
02	AECD-1	Analog Circuits-1
03	Digital Design	Digital Electronics
04	Linear Circuits	Network Analysis
05	Electronics Machines & Measurements	Transducers & Measurement(First Section removed ,Second extended to full marks)
06	Programming Tech	Programming Tech

Sr No.	OLD Structure	Revised Structure
01	AECD-2	Analog Circuits-2
02	Data Structure	Data Structure
03	Electromagnetic Fields.	Electromagnetic Engineering
04	Electronics Communication systems	Analog Communication Systems
05	Circuit Simulation	Circuit Simulation
06	Microprocessor and peripherals	Linear Integrated Circuits

Note: Microprocessor and Peripherals & Linear Integrated Circuits are exchanged with third year and syllabus change in Microprocessor and peripherals naming the subject Microprocessors & Microcontrollers.

Dr Mrs S B Patil
Chairman
BOS(Electronics&
Telecommunication)