Shivaji University, Kolhapur

Revised Syllabus Structure of S.E.,T.E. & B.E. (Electronics Engineering)

Course w.e.f. July 2014-15

Scheme of Teaching & Examination

SE Electronics –I **SEMESTER – III**

Sr. No.	Subject	Teaching Scheme (Hrs)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1.	Engg. Maths III	3	1	0	4	100	25	--	--	125
2.	Electronic Measurement and Instrumentation	3	0	2	5	100	25	--	--	125
3.	Electronics Circuits Analysis & Design -I	4	1	2	7	100	25	50	--	175
4.	Analog Communication	3	0	2	5	100	25	50	--	175
5.	Network Analysis	4	1	0	5	100	25	--	--	125
6.	Programming Language-I	2	0	2	4	--	25	50	--	75
		19	**3**	**8**	**30**	**500**	**150**	**150**	**--**	**800**

SE Electronics –II **SEMESTER – IV**

Sr. No.	Subject	Teaching Scheme (Hrs)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1.	Linear Integrated Circuits	4	0	2	6	100	25	50	--	175
2.	Electronics Circuits Analysis Design-II	& 4	1	2	7	100	25	50	--	175
3.	Data Structures and Algorithms	3	1	0	4	100	25	--	--	125
4.	Digital System and Microprocessor	4	0	2	6	100	25	50	--	175
5.	Control system Engineering	3	0	2	5	100	25	--	--	125
6.	Circuit Simulation	0	0	2	2	--	25	--	--	25
		20	**2**	**8**	**30**	**500**	**150**	**150**	**--**	**800**

Syllabus Structure

Class:- TE(Electronics)-I **SEM-V**

Sr. No.	Subject	Teaching Scheme (Hrs)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1.	Signal & Systems	4	1	0	5	100	25	-	-	125
2.	Power Electronics	4	0	2	6	100	25	50	-	175
3.	Electromagnetic Engineering	3	1	0	4	100	25	-	-	125
4.	VLSI Design	4	0	2	6	100	25	50	-	175
5.	Digital Communication	4	0	2	6	100	25	-	-	125
6.	Programming Lab-II	1	0	2	3	-	25	-	50	75
		20	**2**	**8**	**30**	**500**	**150**	**100**	**50**	**800**

Programming Lab-II should contain minimum four practicals based Signal & Systems and Electromagnetic Engineering topics.

Class:- TE(Electronics)-II **SEM-VI**

Sr. No.	Subject	Teaching Scheme (Hrs)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1.	Digital Signal Processing	4	0	2	6	100	25	-	-	125
2.	Video Engg.	4	0	2	6	100	25	50	-	175
3.	Microcontroller	4	0	2	6	100	25	50	-	175
4.	Computer Architecture & Operating system	4	0	2	6	100	25	-	-	125
5.	Electronic System Design	4	1	0	5	100	25	-	-	125
6.	Mini Project	0	0	2	2	-	25		50	75
		20	**1**	**10**	**31**	**500**	**150**	**100**	**50**	**800**

Minimum 08 Practicals of Mini Project will be based on ESD Syllabus and a Mini Project designed developed and demonstrated by a batch of 2 to 3 students at the time of Oral. Term work of ESD will be assessed on Tutorials (Minimum 10 tutorials).

Syllabus Structure

Class:- BE(Electronics)-I **SEM-VII**

Sr. No.	Subject	Teaching Scheme (Hrs)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1.	Information Theory & Coding Techniques	3	1	0	4	100	25	-	-	125
2.	Embedded System Design	4	0	2	6	100	25	50	-	175
3.	Computer Network	4	0	2	6	100	25	-	50	175
4.	Image Processing	4	0	2	6	100	25	-	-	125
5.	Elective-I	3	1	0	4	100	25	-	-	125
6.	Project-I	0	0	2	2	-	50	-	25	75
		18	**2**	**08**	**28**	**500**	**175**	**50**	**75**	**800**

Class:- BE(Electronics)-II **SEM-VIII**

Sr. No.	Subject	Teaching Scheme (Hrs)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1.	Microwave Engineering	4	0	2	6	100	25	-	50	175
2.	Wireless Comm. N/w	4	0	2	6	100	25	-	-	125
3.	Power Electronics & Drives	4	0	2	6	100	25	50	-	175
4.	Elective-II	3	1	0	4	100	25	-	-	125
5.	Project-II	0	0	4	4	-	50	-	150	200
		15	**1**	**10**	**26**	**400**	**150**	**50**	**200**	**800**

Note:- Practicals based on Sr. No. 1 & 2.

Elective-I	**Elective-II**
Optimization Techniques	System On Chip
Robotics & Artificial Intelligence	Advanced Image Processing
Satellite Communication	Computer Vision
Information Technology	Fuzzy & neutral systems
Advanced Control System	Adaptive signal Processing
Modern Power Electronics Devices	Automatic Electronics
Bio- Medical Instrumentation	High performance computer n/w
Real Time Systems	Remote Sensing & GIS

S.E. (Electronics Engineering) Revised (Sem. II) with effect from July 2014 onwards

ENGINEERING MATHEMATICS-III

(Syllabus revised with effect from July 2014)

Lectures : 3 hrs / week Theory : 100 marks

Tutorials : 1 hr / week Term work : 25 marks

Section – I

Unit 1 Linear Differential Equations: [8]

1.1 Linear Differential Equations with constant coefficients Definition, Complementary function and Particular integral (without method of variation of Parameters).

1.2 Applications of Linear Differential Equations with constant coefficients to Electrical systems.

Unit 2 Vector Differential Calculus: [6]

2.1 Differentiation of vectors 2.2 Gradient of scalar point function and Directional derivative

2.3 Divergence of vector point function and Solenoidal vector fields. 2.4 Curl of a vector point function and Irrotational.

Unit 3. Probability Distributions: [6]

3.1 Random variable 3.2 Binomial Distribution 3.3 Poisson Distribution 3.4 Normal Distribution

SECTION – II

Unit 4 Laplace Transform: [9]

4.1 Definition, Transforms of elementary functions, Properties of Laplace transform.

4.2 Transforms of derivatives and Integral. 4.3 Inverse Laplace transforms formulae.

4.4 Inverse Laplace transforms by using partial fractions and Convolution theorem.

4.5 Solution of Linear differential equation with constants coefficients by Laplace transforms method.

4.6 Heaviside Unit step Function, Dirac-delta function, and Periodic function.

Unit 5 Fourier series: [5]

5.1 Definition, Euler's Formulae.

5.2 Functions having points of discontinuity

5.3 Change of interval

5.4 Expansion of odd and even periodic functions

5.5 Half range series.

Unit 6 Fourier Transforms: [6]

6.1 Fourier Transforms.

6.2 Fourier Sine and Cosine Transforms

6.3 Inverse Fourier, Sine and Cosine Transforms.

6.4 Complex form of Fourier Integral

General Instructions:

1. For the term work of 25 marks, batch wise tutorials are to be conducted. The number

of students per batch should be as per university pattern for practical batches.

2. Minimum number of assignments should be 8 covering all topics.

Nature of Question paper:

1. There will be two sections carrying 50 marks each.

2. Each section should have three questions having internal option.

Reference Books:

1. A text book of Applied Mathematics: Vol. I, II and III by J. N. Wartikar & P.

N. Wartikar , Vidyarthi Griha Prakashan, Pune.

2. Higher Engineering Mathematics by Dr. B. S. Grewal (Khanna Publication Delhi.)

3. Advanced Engineering Mathematics by Erwin Kreyszig.

4. Advanced Engineering Mathematics, by H. K. Das (S. Chand Publication.)

5. Advanced Engineering Mathematics, by Merle C. Potter (OXFORD University Press)

ELECTRONIC MEASUREMENT AND INSTRUMENTATION

Teaching Scheme: Examination Scheme:

Lectures : 3hr/week Theory :100 Marks

Practical : 2 hr/week Term Work: 25 Marks

Objectives-1. To understand the working of basic measurement system and sources of errors in measurement system.

2. To study static and dynamic characteristics of instrument.

3. To study the operation & applications of different testing & measuring instruments.

4. To understand the working principle of sensors and transducers.

5. To study the operation & design of bridge circuit.

6. To study the operation of DAS & data convertors.

Outcomes

1. Student will able to understand the principle of operation of generalized measurement system and different sources of errors in measurements.

2. Student will able to understand static & dynamic characteristics of instrument & based on this will able to select particular instrument for measurement.

3. Student will able to use testing & measuring instrument for measurement.

4. Student will able to understand principle of operation of different sensors and transducers & will able to use the transducers for measurement of physical parameters.

5. Student will able to design bridge circuits.

Section-I

UNIT-I: Introduction to Measurement & Instrumentation (4)

Introduction, definition of measurement, definition of instrumentation, generalized block diagram of measurement system, different sources of errors in measurement, statistical analysis, calibration of

instruments, performance characteristics of instruments – static characteristics, dynamic characteristics, and analysis of dynamic behavior of system, factors affecting on the selection of instrument for measurement.

UNIT-II: Testing & Measuring Instruments (7)

Analogue Instruments- Introduction, types of analog instruments, PMMC, MI, solid state electronic instruments, ohmmeter. Digital Instruments- Digital Voltmeter- ramp type DVM, integrating type DVM, successive approximation type DVM, DFM, DMM, Digital Techometer, Line mains frequency indicator.

UNIT –III: Oscilloscopes (4)

Block diagram of oscilloscope, CRT, vertical deflection system, horizontal deflection system, CRO probes, multi input oscilloscope-dual beam oscilloscope, dual trace oscilloscope, DSO, CRO measurement-measurement of electrical parameter-voltage, current, time period, frequency, phase, testing of electronic component.

Signal Generators And Analyzers. (4)

Signal generators- introduction, Barkhausen criteria for oscillation, audio frequency generators, radio frequency generators, pulse generators.Signal analyzers- introduction, Fourier analyzer, harmonic distortion analyzer, spectrum analyzer, logic analyzer.

UNIT –IV: Sensors and Transducers (6)

Introduction, classification of transducer, thermistor, thermocouple, RTD, strain gauge, piezoelectric transducers, capacitive transducers, PH sensors & their signal conditioning.

Section-II

UNIT-V: Bridges & Application (7)

DC Bridges- Introduction, Wheatstone bridge, Kelvin's bridge. AC Bridges- Introduction, measurement of inductance-Maxwell's bridge, Hay,s bridge, Andersons bridge, measurement of capacitance- Schering bridge, wein bridge

UNIT-VI: Data acquisition system and signal conditioning (6)

Introduction, analog DAS, digital DAS, multi channel DAS, data converters- ADCintegrating type ADC, dual slope integrating type ADC, successive approximation type ADC, flash type ADC. DAC-multiplexer, sample and hold circuit, PC based DAS, RS-232, IEEE-488 field bus.

Text books-

1. A. D. Helfik , W. N. cooper, “Modern electronic instrumentation & measurement techniques”, pearson education

Reference books-

1. A. K. Sawhney. “A course in electrical & electronics measurements & instruments”, Dhanpat Rai & sons publication.
2. S. N.Patil,K.P. pardesi “Electronics measurements & instrumentation”, Electrotech publication.
3. H.S.Kalsi, “Electronics instrumentation”, second edition, Tata McGraw Hill publication.
4. Alok Barua, “Fundamentals of industrial instrumentation”, Wiley India publication.
5. David A.Bell, “Electronics instrumentation & measurements”, 3rd edition Oxford publication.
6. M.M.S.Anand, “Electronics instruments & instrumentation technology”, PHI publication.

Experiments

Any 8 experiments should be conducted.

1. Study of CRO for measurement of electrical parameters.
2. Measurement of phase & frequency by Lissajeous pattern.
3. Study of DSO.
4. Measurement of temperature using RTD Pt100.
5. Measurement of temperature using thermocouple.
6. Measurement of resistance using Wheatstone bridge.
7. Measurement of self inductance using Maxwell’s Bridge.
8. Study of harmonic distortion analyzer.
9. Study of Fourier analyzer.
10. Calibration of voltmeter, thermometer.

11. Study of function generator.

12. Measurement of capacitance using Schering Bridge.

S.E. (Electronics Engineering) Revised (Sem. II) with effect from July 2014 onwards

Electronics Circuits Analysis & Design -I

Teaching Scheme: Examination Scheme:

Lectures : 4 hr/week Theory :100 Marks

Practical : 2 hr/week Term Work: 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. Develop students ability to apply basic engineering sciences to understand the operation & analysis of electronic circuits using diodes and bipolar junction transistors.

3. Provide basic analog electronic circuit design techniques using diodes and bipolar junction transistors and to develop analytical skills.

4. Encourage students to design electronic circuits to meet the desired specifications.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Analyze and design electronic circuits such as rectifiers, voltage regulators and transistorized amplifiers.

2. Apply knowledge of mathematics, science, and engineering to design, analyze and operation of electronic devices and circuits.

3. Explain basic analog electronic circuit design techniques using diodes and bipolar junction transistors.

4. Explain the hybrid model of transistor and analyze the transistor amplifier (CE, CB, CC) using h-parameters.

SECTION-I

Unit-I: Unregulated Power Supply (7)

Analysis of rectifiers : Half wave, full wave: center tap and bridge type, parameters: PIV,TUF, efficiency, ripple factor, regulation, form factor etc. Design of Rectifiers. Filters : Need of Filters, Types of Filters : Capacitor, Inductor, LC and CLC filters, Analysis of above Filters for ripple factor & Regulation. Design of unregulated power supply using FWR with all types of filters.(Numerical & Design based examples are expected.)

Unit-II: Regulated Power Supply (8)

Need of Voltage Regulator, Stabilization factor, Analysis & Design of Shunt regulator (using Zener diode & BJT), Emitter follower regulator, series voltage regulator (using BJT),Series voltage regulator with Pre-regulator, Short circuit & Overload protection circuit. IC regulators: Study and design of regulators using 78XX & 79XX, LM317, IC 723. (Numerical & Design based examples are expected)

UNIT-III: Wave shaping circuits (5)

Linear and Nonlinear waveshaping, High Pass fiter (Differentiator) & Low Pass Filter (Integrator): Analysis for Sinusoidal, Step, Pulse & Square wave input and response for different conditions (RC<<T and RC>>T) .Nonlinear wave shaping circuit: study and analysis of clipping and clamping circuits.Study of voltage multiplier: Doubbler, Trippler (half wave and full wave type)(Numerical & Design based examples are expected)

SECTION: II

UNIT-IV: BJT Amplifiers (8)

Analysis of different biasing circuits (fixed bias, collector to base bias & voltage divider bias), General expression for stability factor, stability factor for all biasing circuits, compensation techniques (Thermistor and diode compensation) , H-Parameters, Hybrid model for transistor (CE,CB & CC configuration),analysis of amplifier for Voltage gain, Current Gain, Input Resistance and Output Resistance in terms of h-parameters, Design of single stage RC coupled amplifier.(Numerical & Design based examples are expected)

UNIT-V: Frequency response of Single Stage RC Coupled Amplifier (7)

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 frequency response to square wave , Gain Bandwidth Product, (Numerical are expected)

UNIT-VI : Field Effect Transistor (5)

JFET: Types, Construction, operation, V-I Characteristics, Parameters of JFET, Biasing of JFET, analysis of Common Source Amplifier (CS) amplifier. MOSFET: Configuration, construction and operation of different MOSFET (NMOS, PMOS), Transfer Characteristics, Comparison of FET , BJT & MOSFET. (Numerical are expected)

Text Books:

1. A Monograph on Electronic design principles- N. C. Goyal, R. K. Khetan

2. Electronic Devices and Circuits- S Salivahanan, N Suresh Kumar, A vallavaraj.

3. Pulse, Digital & Switching Waveforms- Millman, Taub, Rao.

Reference books:

1. Electronic Devices and Circuits- Allen Mottershead- PHI

2. Electronic Devices and Circuits- Anil K. Maini, Varsha Agarwal- Wiley India

3. Electronic Devices and Circuits- David Bell- Oxford publication

4. Electronic Circuits-I- Ravish R. Singh- Pearson Publication

List of Experiments (Minimum 10):

1. Design of Low pass filter

a.Frequency response (sinusoidal)

b. integrator (Square wave input)

2. Design 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 of full wave rectifier with capacitive filter.

6. Design of full wave rectifier with CLC filter.

7. Design of zener shunt regulator

8. Design of transistorized shunt regulator

9. Design of emitter follower regulator

10. Design 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: Question paper contain 50% theory and 50% numerical & Design.

S.E. (Electronics Engineering) Revised (Sem. II) with effect from July 2014 onwards

ANALOG COMMUNICATION

Teaching Scheme:	Examination Scheme:
Lectures : 3 hr/week	Theory :100 Marks
Practical : 2 hr/week	Term Work: 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, transmitters and receivers. It introduces the pulse modulation techniques, antennas, noise and wave propagation.

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. Develop the ability to compare and contrast the strengths and weaknesses of various modulation schemes.

4. Understand and compare various pulse modulation techniques.

5. Understand types of noise, wave propagation and basics of antenna.

Section-I

UNIT-I: Amplitude Modulation : (9 Hrs)

Block schematic of communication system, base band signals, RF bands, Necessity of modulation, Amplitude Modulation principles, AM envelope, frequency spectrum & BW, phase representation of AM wave, Modulation index, % modulation (Numerical expected) AM modulating circuits: Low level AM modulation, medium power AM modulation, high power modulation(diode and transistor circuits), AM transmitters: Block of low level DSBFC, High level DSBFC, Trapezoidal patterns, SSB, Suppression of carrier using balanced modulator, Suppression of unwanted sideband methods: Filter system, phase shift & third method, Vestigial sideband(VSB) in television system.

UNIT - II: AM Receiver: (6 Hrs)

Simplified block diagram of AM receiver, receiver parameters: Sensitivity, Selectivity, BW, dynamic range, Tracking, fidelity, Types of AM receiver: TRF and superhetrodyne (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).

UNIT-III: Angle Modulation: (6 Hrs)

Theory of frequency and phase modulation, mathematical analysis, deviation sensitivity, FM and PM

waveforms, phase deviation and modulation index, frequency deviation and percentage modulation, angle modulation circuits using varactor diode, PLL ,using frequency analysis of angle modulated wave-Bessel function, BW requirements, deviation ratio, Noise and angle modulation, pre-emphasis and de-emphasis.

Section-II

UNIT-IV: FM Receiver : (6 Hrs)

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

UNIT-V: Pulse Modulation : (5 Hrs)

Pulse amplitude modulation, Sampling theorem & type: Natural & flat top, PAM modulation circuit, PAM demodulation circuit, TDM and FDM, Crosstalk in TDM, pulse time modulation, generation of PTM signals (direct-indirect method), PWM modulator, PPM modulators, demodulation of PTM.

UNIT-VI: Noise, Antenna and Wave Propagation: (8 Hrs)

Noise types(Internal noise, external noise), Noise figure. Introduction to radio wave propagation, ground wave,space wave and sky wave. Antenna: basic consideration of radiation mechanism, Antenna Parameters: Antenna gain, captured power density, Antenna captured area & power, Antenna polarization , beam width , BW, input impedance, Types of Antennas - Elementary doublet, Half wave dipole, folded dipole, yaggi-uda antenna .

Text Books:

1. George Kennedy ‘Electronics Communication System’- IVth Edition-Tata McGraw Hill Publication.

2. Wayne Tomasi ‘Electronics Communication System’ -Fundamentals through Advanced.- Vth Edition- Pearson Education.

3. Louis E. Frenzel, ‘ Principles of Electronics Communication Systems’ 3rd edition- Tata McGraw Hill Publication.

Reference Books:

1. Dennis Roddy, John Coolen. 'Electronics Communications 'IVth Edition-Pearson Education

2. V. Chandra Sekar, 'Analog Communication', Oxford university.

3. R P Singh, S D Sapre 'Communication System-Analog & Digital'IInd Edition –Tata Mc Graw Hill Publication

4. B. P. Lathi, Zhi Ding, 'Modern Digital and Analog Communication Systems' 4th edition, Oxford university.

5. Blake, 'Electronics Communication Systems' 2nd edition, cengage Learning.

Term Work:

List of Experiments (Minimum 10):

1. Study Of Amplitude Modulation and Demodulation.

2. Study Of AM Receiver Characteristics.(Sensitivity, Selectivity & Fidelity)

3. Study Of Frequency Modulation.(F.M.)

4. Study Of FM Demodulation.

5. Study Of SSB Modulation & Demodulation.

6. Study Of DSB Modulation & Demodulation.

7. Analysis of standard signals (square and triangular)and Modulated signals(all types of AM,

FM) using spectrum analyzer.

8. Sampling And Reconstruction.

9. Study Of Pulse Amplitude Modulation (PAM.)

10. Study Of Pulse Width Modulation.(PWM)

11. Study Of Pulse Position Modulation.(PPM)

12. Study Of PAM-TDM.

13. Study Of Antenna Parameters.

14. Visit To AIR (AM/FM).

Note:

Visit to AIR station is compulsory. Student should attach report of visit to journal.

S.E. (Electronics Engineering) Revised (Sem. II) with effect from July 2014 onwards

NETWORK ANALYSIS

Teaching Scheme: Examination Scheme:

Lecturers: 4 hr/week Theory: 100 Marks

Tutorial: 1 hr/ week Term Work: 25 Marks

Objectives:

1. To understand and analyze the basic AC and DC circuits
2. To characterize two port network in terms of network parameters
3. To understand the network functions, pole and zero concept
4. To identify and analyze filters and resistive attenuators

Outcomes:

1. Student will be able to analyze the basic AC and DC circuits using KVL, KCL and network theorems
2. Student will be able to derive two port network parameters
3. Student will be able to understand, formulate network function and significance of poles and zeros
4. Student will be able to design proto type, m-derived and composite filter

Section -I

UNIT-I: Network Fundamentals & Topology: (7 Hrs)

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), Star- Delta transformation, Mesh analysis, Node analysis.(DC & AC analysis)

Graph Theory: Network graph, tree, co-tree & loops, incidence matrix, tie set & cut set matrix, Principle of duality.

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UNIT-II: Network Theorems: (7 Hrs)

Superposition Theorem, Millman□s Theorem, Compensation Theorem Norton□s Theorem, The venin□s Theorem, Maximum Power Transfer Theorem, and Reciprocity Theorem. .(DC & AC analysis)

UNIT-III: Two ports network (6 Hrs)

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) :T & Π representation .

Section -II

UNIT-IV: Network Functions: (6 Hrs)

Concept of complex frequency, Network functions for one port & two port networks, significance of poles & zeros. Properties and necessary condition for driving point functions, Properties and necessary condition for Transfer functions, Time domain response from pole and zero plot

UNIT-V: Resonance: (6 Hrs)

Definition, Types: series & parallel resonance. Series resonance- resonant frequency, Impedance and phase angle of series resonant circuit, current & voltage across L & C w.r.t. frequency, Effect of resistance on frequency response, Bandwidth and Selectivity, Quality factor and its effect on bandwidth, Magnification Parallel resonance – Anti resonance frequency, variation of impedance & admittance with frequency, Qfactor and reactance curves, Magnification

UNIT-VI :: Filters & Attenuators: (08 Hrs)

Filters Definitions, classification, characteristics of different filters: attenuation constant (α) , phase shift (β) propagation constant (γ) characteristic impedance (Zo) , the relation between decibel & Neper.

Design & analysis of constant K, (low pass, high pass, band pass & band stop filters): (T & Π sections.)

Design & analysis of M derived (LPF & HPF) & composite filters (T & Π sections.) Attenuators - Definitions, classification, Analysis & design of T type, Π type , α Lattice , bridged- T & L types attenuators Equalizer: Inverse network, series and shunt equalizer.

Term Work: (Minimum10 tutorials):

Minimum 10 tutorials based on above syllabus covering all units.

Text book:

1 .A. Sudhakar, Shyammohan S.Palli „Circuit & Network – Analysis & Synthesis III

rd

Edition –

Tata McGraw Hill Publication

2. D. Roy Choudhury „Networks & Systems – Wiley Eastern Ltd.

3. S. Sivanagaraju, G. Kishor, "Electrical Circuit Analysis" Cengage Learning

Reference books:

1. M.E.Van Valkenburg "Network Analysis" - IIIrd Edition , Pearson Education / PHI

2. Soni Gupta „Electrical Circuit Analysis Dhanpat Rai & Co.

3. C P Kuriakose, "Circuit Theory" PHI publication

4. R G Kaduskar, S O Rajankar, " Network Fundamental and Analysis" Wiley India

*Note for paper setter:

• Question paper shall consist of approximately 60% Numerical problems & approximately 40% theory should be covered.

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PROGRAMMING LANGUAGE-I

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

Course Objectives:

1. To understand the basic concepts of procedure oriented programming language.
2. To use control structures, functions, arrays, pointers and structures for programming applications
3. To use the files for handling the database applications.

4. To apply the skills for solving the engineering problems.

Course Outcomes:

1. Student will be able to understand the basic concepts of procedure oriented programming language.

2. Student will be able to use the concepts of control structures, functions, arrays and structures for programming applications.

3. Student will be able to understand and implement the concept of file handling for database applications.

4. Student will be able to apply the skills for solving the engineering problems.

SECTION-I No. of Hours

I An Overview of C 04

Compilers vs. Interpreters, The structure of a C Program, The Library and Linking, Separate Compilation, Compiling a C Program, Basic Data Types, Type conversion in C, Identifiers Names, Variables, Type Qualifiers-const, Storage Class specifiers ,Operators and expressions.

II Input , Output and control statement: 04

Reading and Writing Characters, Formatted Console I/O, printf(), scanf(), Suppressing Input, control statement- if , if –else , nested if –else, while, do –while , switch case, for , nested for loop, goto statement

III Functions and Pointers: 04

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, address operator (&),pointer notation, declaration of pointer, initializing pointer ,void pointer, null pointer, use of pointers, pointer to pointer, dynamic memory allocation.

SECTION-II

IV Array and Strings : 04

Arrays -Introduction, Declaration and Initialization of array, types of arrays-two dimensional array, multi dimensional array Strings- Array Initialization, Arrays of Strings, Arrays, Manipulating Strings,

string functions.

V Structures, Unions, Enumerations, and typedef : 04

Structures, Arrays of Structures, Passing Structures to Functions, Structure Pointers, Arrays and Structures Within Structures, Unions, BitFields, Enumerations, Using sizeof to Ensure Portability, typedef

VI File handling: 04

Concept of file – text, binary, files and streams, opening and closing of files,

modes of files read, write operations.

Text Books:

1 Programming With C - 2nd Edition - Byron Gottfried , Schaum's Outline Series Mcgraw –Hill

2. Programming in ANSI C - E Balgurusamy, Vth Edition- Tata Mc- Graw Hill Publication

Reference Books:

1. Pradip Dey,Manas Ghosh-'Programming in C'-II edition-OXFORD University Press

2. Brian W. Kernighan ,Dennis M. Ritchie-'The C Programming Language' –IInd EditionPrentice Hall of India

3. C The Complete Reference – Herbert Schildt (Tata McGraw-Hill Edition)

4.Computer Concept and C Programming – Vikas Gupta (Wiley- Dreamtech)

List of Experiments:

1. Develop Program using decision control statements

2. Develop Program using control statements

3. Develop Program using loop control statements

4. Develop Program using functions

5. Develop Program using pointers

6. Develop Program using array

7. Develop Program using two dimensional arrays.

8. Develop Program using structures

9. Develop Program using dynamic memory allocation

10. Develop Program using strings

11. Develop Program using any sorting technique.

12. Develop Program using file handling.

.

Note: Minimum 10 experiments based on above syllabus using open source platforms (Linux)

S.E. (Electronics Engineering) Revised (Sem. II) with effect from July 2014 onwards

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:

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

SECTION-I

I.Differential Amplifiers 06

Differential Amplifier-Configuration, DC & AC Analysis of Dual Input Balanced Output Configuration. Comparative study of other configuration of Differential amplifiers, Constant Current Bias, Current Mirror, DC coupling & Cascade differential stages, Level Translator & its need.

II. OP-Amp Characteristics 08

Block Diagram of Op-Amp, Ideal & Practical Op-amp specifications, Transfer characteristics of Opamp, Op-amp parameters & measurement: Input & output offset voltages, Input & output offset currents, Input Bias current, slew rate, CMRR, PSRR, Thermal drift. Comparative study of Data Sheets – µA 741, OP 07, LM 324, LM 311, LM 308, LM380, CA 3140.

III Op-Amp Configurations & Frequency Response. 07

Open Loop & Closed Loop- Inverting, Non-Inverting and Differential (Using one op-amp). Analysis for Av, Ri, Ro, Bandwidth, and Total output offset voltage. AC & DC amplifiers – all configurations.(Numericals are expected).Open loop frequency Response, Closed loop frequency response, circuit stability, slew rate.

SECTION-II

IV Linear & Non-Linear Applications 09

Summing amplifier (Inverting & Non-Inverting), Subtractor, Integrator, Differentiator, Instrumentation Amplifier (3 op-amps), Instrumentation amplifier using transducer bridge, Single Chip Instrumentation Amplifier(INA Series), I-V & V-I converter. (Numericals are expected). Comparators, Zero Crossing Detector, Window detector, Schmitt trigger, peak detector, log and antilog amplifier, precision rectifier, sample and hold circuit.

V Active Filters 04

First & Second Order Butterworth Low Pass, High Pass, Band Pass, Band Reject, & All Pass Filters, State Variable, Bi-Quad, KRC-Filters (Analysis & Numericals are Expected).

VI Monolithic IC Applications 06

Sine wave generator- RC phase Shift, Weins Bridge, & Quadrature oscillator. Square wave (Astable Multivibrator), Monostable Multivibrator, & Triangular Wave generator, V-F, F-V converter using Op-Amp. IC 555 (Timer): Block Diagram, Multivibrators and Applications. IC 566 VCO, PLL- Introduction, Block Diagram, Principles & description of individual blocks, IC 565 PLL & Applications. IC 8038 Waveform generator (Numericals are expected).

Text Books:

1 Ramakant. A. Gayakwad, “Op-Amps & Linear Integrated Circuits”, 3rd Edition, PHI.

2 S.Salivahanan & Bhaaskaran, “Linear Integrated Circuits”, 1st Edition, Tata McGraw

Hill.

Reference Books:

1 National Analog & Interface products Data book—National Semiconductors

2 T.R Ganesh Babu, “Linear Integrated Circuits”, 3rd Edition, SciTech Publication

3 Sergio Franco, “Design with op-amp & Analog Integrated Circuits”, 3rd Edition, Tata McGraw Hill

4 David. A. John & Ken Martin, “Analog Integrated Circuit Design”, Student Edition, Wiley.

5 Roy Choudhury & Shail. B. Jain, “Linear Integrated Circuits”,2nd Edition, New Age Publishers

List of Experiments

Minimum 12 Experiments:

1. Study of Data sheets of following IC's (Compulsory)

µA 741, OP 07, LM324, LM 308, LM380, CA 3140, LM 311.

2. Measurement of op-amp parameters Using IC 741

a) Input offset voltage b) Input offset current c) slew rate d) CMRR.

3. Study of Inverting amplifier for DC & AC inputs using IC 741

4. Study of Non-Inverting amplifier for DC & AC inputs using IC 741

5. Frequency Response of Inverting & Non-Inverting amplifier using IC 741

6. Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non-Inverting

Configuration using IC LM 308

7. Study of Instrumentation Amplifier using LM 324

8. Study of V-I & I-V Converter using IC 741

9. Study of Schmitt Trigger using IC 741 & Window detector using LM 311

10. Study of Comparator & ZCD using LM324/OP 07

11. Study of Precision Rectifier using IC 741

12. Study of Butterworth Filter (Any Two) using IC 741

13. Study of Triangular & square wave generator using IC 741

14. Study of IC 555 Timer as Astable & Monostable Multivibrator (NE/SE 555)

15. Study of IC NE 565 PLL

16. Study of V-F converter using LM311

17. Study of Weins Bridge Oscillator using IC 741

18. Study of Function Generator using IC 8038

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Electronics Circuits Analysis & Design -II

Teaching Scheme: Examination Scheme:

Lectures : 4 hr/week Theory :100 Marks

Practical : 2 hr/week Term Work: 25 Marks

POE : 50 Marks

Course Objectives:

The course aims to:

1. Apply knowledge of mathematics, science, and engineering to design, analyze and operation of electronic circuits.

2. Provide an introduction and basic understanding feedback amplifiers, power amplifiers, oscillators, multivibrators, SMPS.

3. 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

4. Provide analog electronic circuit design techniques using diodes, bipolar junction

transistors and field effect transistors, and to develop analytical skills.

5. Design electronic circuits to meet desired specifications.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Analyze and design electronic circuits such as wave shaping circuits, multistage amplifiers, power amplifiers.

2. Explain basic analog electronic circuit design techniques using diodes, bipolar junction transistors and field effect transistors.

3. Demonstrate the analytical skills developed while designing the electronic circuits using diodes, bipolar junction transistors and field effect transistors.

4. Describe and design different types of oscillators and multivibrators as per given specifications and requirement using bipolar junction transistors and field effecttransistors.

SECTION-I

Unit-I : Feedback Amplifier (6)

Need & types of feedback, Advantages of negative feedback, types of negative feedback (Voltage series, Current series, Voltage shunt, Current shunt feedback amplifiers) , study of Emitter follower and darlington amplifier with bootstrapping principle (Numerical are expected)

Unit- II : Multistage Amplifier (6)

Need of Cascading, evaluation of Ri, Ro, Ai, Av, Types of coupling, RC coupled, Transformer coupled, Direct coupled amplifer. Design of two stage RC coupled amplifier with and without feedback and Direct coupled amplifier. (Numerical & Design based examples are expected)

Unit- III: Power amplifier (8)

Need of Power amplifier, Classification of power amplifier, Power considerations, distortion in power amplifier (Phase, frequency, harmonics),calculation of IInd Harmonic or distortion using Three point method, Analysis & Design of Class A single ended transformer coupled amplifier & class A Push pull amplifiers, Class B amplifier & class B push pull amplifier, Cross over diction and methods to eliminate cross over distortion, complimentary symmetry amplifier.(Numerical & Design based examples are expected)

SECTION-II

Unit- IV : Oscillator (7)

Barkhausen's criteria, Frequency and amplitude stability, classification of oscillator, RC Oscillators : analysis and design of RC phase shift (Using BJT & FET), Wein bridge using BJT, LC Oscillators: Colpitts and Hartley oscillator using BJT. Study of Crystal oscillator. (Numerical & Design based examples are expected)

Unit- V : Multivibrator (8)

Transistor as a switch, Transistor switching Parameters,Classification of Multivibrator, analysis and design of bistable (Fixed Bias & Self Bias), monostable & astable multivibrator (Collector

coupled),Triggering methods: Symmetrical & unsymmetrical, analysis and design of Schmitt trigger. (Numerical & Design based examples are expected)

Unit- VI : Switch Mode Power Supply (SMPS) (5)

Introduction of SMPS, comparison of SMPS with linear power supply, Step -up and stepdown SMPS, Detail study of LM3524

Text Books:

1 A Monograph on Electronic design principles- N. C. Goyal, R. K. Khetan

2 Electronic Devices and Circuits- S Salivahanan, N Suresh Kumar, A vallavaraj.

3 Pulse, Digital & Switching Waveforms- Millman, Taub, Rao.

Reference books:

4 Electronic Devices and Circuits- Allen Mottershead- PHI

5 Electronic Devices and Circuits- Anil K. Maini, Varsha Agarwal- Wiley India

6 Electronic Devices and Circuits- David Bell- Oxford publication

7 Electronic Circuit Analysis – B.Visvesvara Rao et.al – Pearson education

List of Experiments(Minimum 10):

1. Design and frequency response of voltage series feedback amplifier.
2. Design and frequency response of direct coupled amplifier.
3. Design and frequency response of two stage RC coupled amplifier.
4. Design of transformer coupled class A amplifier.
5. Design of RC phase shift oscillator using BJT
6. Design of colpitts oscillator using BJT
7. Design of hartley oscillator using BJT
8. Design of Astable multivibrator
9. Design of monostable multivibrator using BJT
10. Design of bistable multivibrator using BJT

11. Design of Schmitt trigger using BJT

12. Study of Step up and stepdown SMPS

13. Study of single stage common source (CS) amplifier.

14. Study of Different triggering circuits.

Note for paper setter: Question paper contain 50% theory and 50% numerical & Design.

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DATA STRUCTURES & ALGORITHMS

Teaching Scheme: 3hr/week

Tutorial : 1hr/week

Examination Scheme: Lectures:

Theory : 100 Marks

Term Work : 25 marks

Course objectives(CEOs):

1. To provide the student with a solid foundation in Engg. Fundamentals & programming required to solve basic Engg. Problems.

2. To introduce the concepts of array, record & pointers.

3. To understand the importance of linked lists and its applications.

4. To train the students so that they will be prepared to work on multidisciplinary problems.

5. To introduce the concepts of non linear data structures & searching techniques.

Course outcomes(Cos):

1. Students will be able to solve the basic Engg. Problems efficiently.

2. Students will be able to implement the concepts of basic data structure operations during software development.

3. Students will be able to Design, implement, test, and debug programs using a variety of data structures.

4. Students will be able to apply algorithm analysis techniques to evaluate the performance of an

algorithm.

5. Students will be able to implement the concept of trees, graphs and searching techniques during software development.

Section-I

UNIT-I: Introduction & Overview : (1 Hrs)

Introduction to theory of data structures & its data types, Algorithms: complexity, time space trade-off with example.

UNIT- II: Arrays, Records & Pointers: (6 Hrs)

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 memory, parallel arrays, matrices, sparce matrices.

UNIT III: Linked Lists: (6 Hrs)

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.

UNIT IV : Stacks & Queues: (6 Hrs)

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, circular,

double ended, priority, Quicksort ,application of queues.

Section-II

UNIT V: Trees : (8 Hrs)

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.

UNIT VI: Graphs: (6 Hrs)

Introduction, Graph theory terminology, sequential representation of graphs: Adjacency Matrix, Path

matrix, Warshall's Algorithm, shortest paths, linked representation. Operations, Traversing, Posets, Topological sorting .

UNIT-VII: Hashing : (3 Hrs)

Hashing, Hash functions, collision, chaining

Text Books:

1. Seymour Lipschautz –'Data structures' - Shaum's outlines -Tata McGraw Hill

2. ISRD group –'Data structure using C '–- Tata McGraw Hill Reference Books:

1. Langsam, Augenstein, Tenenbaun –'Data structure using C & C++ ' - PHI

2. Mark Allen Weiss- 'Data structure & algorithm analysis in C'- 2nd edition –Pearson Education (LPE)

3. M.T. Goodrich, R. Tamassia, D. Mount- Data Structures & Algorithms in C++- Wiley Publication

4. A.N. Kamthane-" Introduction to Data structures in C"- Pearson Education (LPE)

5. Data structure – A programming Approach with C- D.S Kushawaha, A.K.Misra-PHI Publi.

6.Data structures – A pseudocode Approach with C- R.F.Gilberg,b.a.forouzan-Cengage Learning.

Term Work : Tutorial (Minimum 12 tutorials based on C language on the following)

Unit I 01 tutorial

Unit II 02 tutorials

Unit III 03 tutorials

Unit IV 03 tutorials

Unit V 02 tutorials

Unit VI 01 tutorial

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DIGITAL SYSTEMS & MICROPROCESSOR

Teaching Scheme: Examination Scheme:

Lecturers: 4hr/week Theory: : 100 marks

Practical : 2hr/week Term Work : 25 marks

POE : 50 marks

Course Educational Objectives(CEOs):

1 To Understand principles, characteristics and operations of combinational & sequential logic circuits.

2 Explain Boolean algebra and the various methods of Boolean function reduction, Kmap Reduction.

3. To design, implement and analyze, asynchronous and synchronous sequential circuits

4. To develop fundamental knowledge and core expertise in microprocessor.

5. To write assembly language programs for microprocessor useful in various applications.

6. To know the importance of different peripheral devices and their interfacing to 8085.

Course outcomes: (COs)

1. Students will be able to apply the concepts of digital circuits and design combinational logic and implement.

2. Students will be able to apply various Boolean expression reduction techniques to minimize the hardware.

3. Students will be able to Demonstrate logical skills, debugging skills in designing small digital circuits for Industrial applications

4. Students will be able to write Assembly language program in 8085 for various applications.

5. Students will be able to apply various interfacing techniques using 8085 for various applications.

6. Students will know the design aspects of basic microprocessor based system.

SECTION-I

UNIT I: COMBINATIOAL LOGIC: (6 HOURS)

Reducing Boolean Equations: MIN terms, MAX terms, K-maps (up to four variables), adder, subtractor, four bit parallel adder, look ahead carry adder, Parity bit generator/checker, MUX/DEMUX, decoder, BCD to 7 Segment Decoder, priority encoder, Code converters, Design of ALU, Hazards

UNIT II: SEQUENTIAL LOGIC: (8 HOURS)

Flip Flop: Operation, Characteristics Table, Excitation Table, FF State Diagram, Timing Diagram, Important specifications of FF, conversion of FF. State machines: Mealy and Moore machines, Analysis and design of a sequential circuit using state diagram. State reduction.

UNIT III: DIGITAL SYSTEM APPLICATIONS: (6 HOURS)

Shift Registers, Universal shift registers, Counters: Synchronous, Asynchronous, Ring counter, Johnson counter. Counter design issues: Effects of propagation delay. Memory and their types like ROM, RAM, EPROM, EEPROM, D-RAM etc.

SECTION-II

UNIT IV: FUNDAMENTALS OF MICROPROCESSOR: (6 HOURS)

8085 architecture, programming model: pin functions, De-multiplexing of Address/Data bus, Introduction to Timing diagram-T-state, machine cycle, WAIT state, WAIT state generators. State transition diagram, Single cycle and single step execution, stack operations and subroutines, Interrupt structure

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UNIT V: PROGRAMMING OF 8085 CPU: (7 HOURS)

Addressing modes, Instruction set, Timing diagram of instructions, Assembly language programming

UNIT VI: INTERFACING TECHNIQUES: (7 HOURS)

Data transfer techniques: Polled I/O, Interrupt Driven, DMA data transfer, decoding techniques:

Memory mapped I/O, I/O mapped I/O. Study of PPI 8255, Interfacing of LEDs, Seven segment display, keyboard, Thumb wheel switches, Stepper motor, Study & Interfacing of ADC 0809, DAC 0808

Text Books:-

1. A. Anand Kumar „Fundamentals of Digital Circuits -. PHI

2.Ramesh Gaonkar, “Microprocessor Architecture Programming and Application with 8085”, Penram International Publishing India.

Reference Books:

1. Willim I. Fletcher.An Engineering Approach to Digital Design—PHI/ Pearson

2. A.P. Malvino, D.P. Leach „Digital Principles & Applicatios -VIth Edition-Tata Mc Graw Hill,

Publication.

3. G.K.Kharate “Digital Electronics”,OXFORD

4. S Salivahanan ,S Arivazhagon ,”Digital circuits and Desgin”,VIKAS

5. Norman Balabanian Bradle Carlson. „Digital Logic Design Principals,. Wiley Publication

6. Douglas V.Hall, “Microprocessors and Digital Systems”, 2nd Edition , Tata Mc-Graw Hill.

7. K. Udaykumar,b S Umashankar,The 8085 Microprocessor-Architecture & programming and Interfacing

8. Dr. Anil Maini, Digital Electronic : Principles and Integrated circuits Wiley Publi.

9. Intel data sheet

List of Experiments: [Minimum 10]

Section-I (MINIMUM 5)

1. K map based implementation of combinational logic

2. Implementation of combinational logic using MUX

3 Study of 7 segment decoder driver. (IC 7447)

4. Study of Flip Flops (SR FF, D FF, JK FF, T FF)

5. Design and test MOD N ripple counter/ synchronous counter.

6. Design and test Shift Register.

7. Design and test 3 bit sequence detector

Section-II (MINIMUM 5)

8. Experiment Based on Arrays:- (Minimum one)

Exchange, Addition, Finding Minimum / Maximum, Ascending / Descending, etc.

9. Experiment Based on Arithmetic and Logical Operation:- (Minimum one) Multidigit Addition, Multiplication / Division, Finding Even / Odd Numbers, Factorial,Fibonacci Series.

10. Experiment Based on Code Conversion:- (Minimum one)Binary to BCD, BCD to Binary

11. 8255 Based Experiments: (Minimum one)

1. Display interface using 8255.

2. Thumbwheel Switch interface using 8255.

3. Program on various operating modes of 8255

4. Stepper motor interface.

12. ADC 0809 interface.

13. DAC 0808 interface.

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Control Systems Engineering

Teaching Scheme Examination Scheme

Lectures : 3 Hours/Week Theory : 100 Marks

Practical : 2 Hours/Week Term work : 25 Marks

Course Objectives:

Objectives of this course are:

1. To study the fundamental concepts of Control systems and mathematical modeling of the system.

2. To study the concept of time response and frequency response of the system.

3. To study the basics of stability analysis of the system.

Course Outcome:

1. Students will be able to derive the mathematical model of different type of the systems.

2. Students will understand the basic concepts of control system.

3. Students will understand the analysis of systems in time and frequency domain.

4. Students will be able to apply the control theory to design the conventional PID controller widely used in the industries.

SECTION – I

UNIT-I: Introduction to Feedback Control System (7 Hrs.)

Classification of control System, Mathematical models of physical system- Electrical & Mechanical System , Transfer function of electrical systems, Block diagrams and reduction techniques including signal flow graphs using Mason's gain formula.

UNIT-II: Feedback characteristics of Control system (4 Hrs.)

Feedback & Non-feedback systems, Reduction of parameter variations by use of feedback, control over system dynamics by use of feedback, control of effect of disturbance signals by use of feedback, The concept of stability, Routh Hurwitz stability criteria.

UNIT-III: Time Domain Analysis (7 Hrs.)

Time response of first order & second order system using standard test signal, steady state errors and error constants, Root locus techniques- Basic concept, rules of root locus, application of root locus techniques for control system.

SECTION – II

UNIT-IV: Frequency Domain Analysis (7 Hrs.)

Introduction, correlation between time & frequency domain, Bode plots, gain margin, phase margin, effect of addition of poles & zeros on bode plots, Polar plots, Nyquist stability.stability using Bode plot.

UNIT-V: State Space Analysis (4 Hrs.)

Concept of state, state variables & state model State-space representation, computation of the state transition matrix, transfer function from the state model, controllability of linear system, observability of linear system.

UNIT-VI: Compensators & controllers (7 Hrs.)

a. Compensators- Need of compensation, lead compensation, lag compensation, Lead-lag compensation. b. Controllers- ON-OFF controller, Proportional, Integral, derivative & PID controllers, principle and operations. PLC controllers- Block schematic, PLC addressing, Liquid level control using ladder diagram.

Text Books:

1. I.J. Nagrath, M.Gopal “Control Systems Engineering”, 5th Edition, New Age International Publication

2. R. Anandanatarajan, P. Ramesh Babu , “Control Systems Engineering”, Scitech Publications .

3. A. Ananadkumar, “Control system Engineering” PHI publication 2nd edition.

4.John R. Hackworth,Fredrick D. Hackworth “ Programmable Logic Controller” Pearson publication.

Reference Books:

1. Norman S. Nise “Control Systems Engineering”, 8th edition, Wiley edition.

2. Samarjeet Ghosh, “Control Systems Theory & Applications”, 1st edition, Pearson education.

3. S.K. Bhattacharya, “Control Systems Engineering”, 1st edition, Pearson education.

4. S. N. Shivanandan,S. N. Deepa,” Control System Engineering” Vikas Publications 2nd edition

5.Dhanesh N. Manik “ Control Systems” Cengage learning.

Practical List(minimum 8 experiments):

1. Determination of transfer functions of physical system.

2. Transient response of second order system for a step input.

3. Verification of Bode plot using Lead Network.

4. Verification of Bode plot using Lag Network.

5. Study of ON-OFF controller.

6. Study of Proportional controller

7. Study of PID controller

8. Response of PID controller.

9. Study of PLC.

10. Frequency response using Bode plot.

11. Frequency response using polar plot.

Note: Any five experiments as Hardware based practicals & remaining software based practicals.

Guidelines for Paper Setter:

Theory Question Paper should include 40% Numerical Problems.

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CIRCUIT SIMULATION

Teaching Scheme: Lecture 1 hrs/week Examination Scheme:

Practical: 2hrs/week Term Work 25 Marks

UNIT I: Introduction and overview: 2hrs

Role of simulation in circuit design, DC analysis of linear and nonlinear circuits, models for common semiconductor devices. Introduction to simulation software tools like Orcad/Proteus/ open source simulation and PCB design software.

UNIT II: Schematic Design and Simulation: 6hrs

Introduction, input files, nodes, circuit elements, sources, output variables, format of circuit and output files, schematic drawing, design rule check (DRC), net list details. Type of analysis: Bias point, time domain, AC sweep, DC sweep.Parametricand Monte Carlo simulation, concept of noise analysis.

UNIT III: PCB Design 4 hrs

Types of PCBs, Layout planning, general rules and parameters, design rules for analog and digital circuit PCBs, PCB technology trends, multilayer boards. Design of single board and multiboard PCBs using PCB design software's.

References:

1. R. Raghuram, " Computer simulation of Electronics Circuits", Wiley Publication.

2. M.H. Rashid, "Introduction to PSpice Using OrCAD for circuits and electronics, Prantice Hall publication.

3. User's Guide, "Orcad® Capture", Cadence Design Systems, Inc.

4. Farid N. Najm, "Circuit simulation", Wiley Publication.

5. Proteus User Guide.

6. KraigMitzner, "Complete PCB DesignUsingOrCad Capture and Layout". Elsevier

Publication, 2007.

Practical's: Twelve experiments to be conducted based on above syllabus.