Shivaji University, Kolhapur.

Revised Syllabus And structure of S.E. Part-I & II (Electronics Engineering)

Semester III and IV

(w.e.f. Academic Year 2008-09)

Shivaji University, Kolhapur.

Revised Syllabus Structure of Second Year Engineering
S.E.(Electronics Engineering) Course w.e.f. July 2008-09

Scheme of Teaching & 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	4	1	-	5	100	25	-	-	125
2	Electrical Machines	3	-	2	5	100	25	50	-	175
3	Electronic circuit Analysis & Design - I	4	1	2	7	100	25	50	-	175
4	Network Analysis	4	1	-	5	100	25	-	-	125
5	Data Structures & Algorithms	3	1	-	4	100	25	-	-	125
6	Programming Lab.	2	-	2	4	-	25	50	-	75
	Total	20	4	6	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	Electronic Circuit Analysis & Design - II	4	-	2	6	100	25	50	-	175
2	Analog Communication	4	-	2	6	100	25	50	-	175
3	Signals & Systems	3	1	-	4	100	25	-	-	125
4	Digital Design	4	-	2	6	100	25	50	-	175
5	Electronic Measurement & Instrumentation	3	-	2	5	100	25	-	-	125
6	Circuit Simulation)	1	-	2	3	-	25	-	-	25
	Total	19	1	10	30	500	150	150	-	800

Shivaji University Kolhapur
Proposed Structure of T.E. (Electronics Engineering) Course
Scheme of Teaching & Examination

SEMISTER – V

Sr. No	Name of the Subject	Teaching Scheme (Hrs)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Microprocessor & Interfacing	4	-	2	6	100	25	50	-	175
2	Analog Integrated Circuits	4	-	2	6	100	25	50	-	175
3	Digital Communication	4	-	2	6	100	25	-	50	175
4	Electromagnetic Engineering	3	1	-	4	100	25	-	-	125
5	Control System Engineering	3	-	2	5	100	25	-	-	125
6	Matlab Design Lab.	1	-	2	3	-	25	-	-	25
	Total	19	1	10	30	500	150	100	50	800

SEMISTER – VI

Sr. No	Name of the Subject	Teaching Scheme (Hrs)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Microcontroller	4	-	2	6	100	25	50	-	175
2	Computer Organization & Operating system	3	1	-	4	100	25	-	-	125
3	VLSI Design	4	-	2	6	100	25	-	-	125
4	Power devices & Applications	4	-	2	6	100	25	50	-	175
5	Industrial Management & Operation Research	3	1	-	4	100	25	-	-	125
6	Electronic System Design & Mini project	2	-	2	4	-	25	-	50	75
	Total	20	2	8	30	500	150	100	50	800

Note: The above proposed structure is subject to change.

Shivaji University Kolhapur
Proposed Structure of B.E. (Electronics Engineering) Course
Scheme of Teaching & Examination

SEMISTER – VII

Sr. No	Name of the Subject	Teaching Scheme (Hrs)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Embedded System	4	-	2	6	100	25	50	-	175
2	Power Electronics & Drives	4	-	2	6	100	25	50	-	175
3	Digital signal Processing	4	-	2	6	100	25	-	-	125
4	Information Theory & Coding Techniques	3	1	-	4	100	25	-	-	125
5	Elective-I	3	1	-	4	100	25	-	-	125
6	Project-I.	-	-	4	4	-	50	-	25	75
	Total	18	2	10	30	500	175	100	25	800

SEMISTER – VIII

Sr. No	Name of the Subject	Teaching Scheme (Hrs)				Examination Scheme (Marks)				
		L	T	P	Total	Theory	TW	POE	OE	Total
1	Computer Network	4	-	2	6	100	25	-	50	175
2	Audio & Video Engg.	4	-	2	6	100	25	50	-	175
3	Microwave Engg.	4	-	2	6	100	25	-	-	125
4	Elective-II	3	1	-	4	100	25		-	125
5	Project-II	-	-	8	8		100	-	100	200
	Total	15	1	14	30	400	200	50	150	800

Note: The above proposed structure is subject to change

Elective-I

1. Biomedical Instrumentation
2. Mechatronics
3. Wireless Mobile communication
4. RADAR & Electronics Navigation System
5. Fiber Optic communication
6. Process Instrumentation
7. Advanced control Engg.
8. Remote sensing & GIS

Elective-II

1. Digital Image Processing
2. Real Time operating system
3. Low power VLSI design
4. Fuzzy Logic & Neural networks
5. Advance Digital signal processing.
6. Broad band communication
7. Information technology
8. System on Chips

Shivaji University, Kolhapur.
Revised Syllabus w.e.f. Academic Year 2008-09

S.E. (Electronics Engineering)
Semester -III

ENGINEERING MATHEMATICS – III

Teaching Scheme		**Examination Scheme**	
Lectures	:4 hours/week	Theory	:100 marks
Tutorial	:1 hour/week	Term work	: 25 marks

SECTION – I

UNIT-I: Linear Differential Equations: **(7 Hrs)**

Linear Differential Equations with constant coefficients, Homogenous Linear differential equations, method of variation of parameters, Applications of LDE with constant coefficients to Electrical systems.

UNIT-II: Partial Differential Equation: **(5 Hrs)**

Four standard forms of partial differential equation of first order

UNIT-III:Fourier series: **(6 Hrs)**

Definition, Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, expansions of odd and even periodic functions, Half range series.

UNIT-IV:Fourier transforms: **(6 Hrs)**

Fourier transforms, Fourier sine and cosine transforms, complex form of Fourier integral, Finite Fourier sine and cosine transforms.

SECTION – II

UNIT–V:Laplace Transform: **(7 Hrs)**

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, Periodic function.

UNIT- VI:Probability: **(7 Hrs)**

Definitions of Random variable, Discrete and continuous random variable, Expected value of random variable, Variance, Moments and moment generating functions. Probability mass function and probability density function, Probability distribution for random variables , Binomial, Poisson and Normal distributions

UNIT -VII: Vector Differentiation: **(4 Hrs)**

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.

UNIT- VIII: Vector Integration: **(6 Hrs)**

The line integral, Surface integral, volume integral, Gauss's Divergence theorem, Stoke's theorem, Green's theorem (Without proof).

General Instructions:

1. For the term work of 25 marks, batchwise 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. There will be four questions in each section and three question should be attempted from each section.

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.
3. Advanced Engineering Mathematics by Erwin Kreyszig.
4. A textbook of Engineering Mathematics by N. P. Bali, Ashok Saxena and N. Ch. S. N. Iyengar- Laxmi Publication, Delhi.
5. Fundamental of Statistics by S. C. Gupta.

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S.E. (Electronics Engineering)
Semester -III

ELECTRICAL MACHINES

Teaching Scheme:	**Examination Scheme:**
Lecturers : 3 hr/week	Theory :100 marks
Practical : 2 hr/week	Term Work : 25 marks
	POE : 50 marks

Section -I

UNIT-I: D.C. Motors: **(7 Hrs)**

Speed control of shunt & series motors , armature voltage control , flux control , series – parallel control, Electrical braking –Dynamic, Plugging , regenerative for shunt and series motors , starters for Dc motors – three point , four point starters , face plate type controller, electronic starter, numerical on speed control.

UNIT-II: Three Phase Systems: **(6 Hrs)**

Construction of 3- phases alternator, parallel operation & synchronization. Synchronizing current, torque & power. Relationship between line & phase values for star & delta connections. Measurement

of active, reactive power & power factor in balanced 3- phase load using two wattmeter methods (Numerical treatment)

UNIT-III: Three Phase Transformer: (4 Hrs)
Construction , type of connection – Star-Star , Star- Delta, Delta- Star, Delta-Delta, V-V & T-T connections, selection criterion of single phase & 3 phase transformers.

UNIT-IV: Fractional Horse Power Machines: (4 Hrs)
Working principle, construction & application of reluctance motor , hysteresis motor , synchros, tachogenerators – A.C ., D.C.

Section -II

UNIT-V: Three Phase Induction Motor : (8 Hrs)
Construction , types , working principle , torque equation – relation among starting maximum & running torque , torque slip characterstics, effect of rotor resistance on maximum torque , speed control methods – frequency control , pole changing methods , voltage control , rotor resistance control , constant V/F & constant voltage – variable frequency , modes of operation , starters for three phase induction motor- D.O.L, Star/delta , autotransformer, rotor resistance starter. Numericals on power stages & torque equations. Equivalent circuit , linear induction motor.

UNIT-VI: Servo & Stepper Motors: (3 Hrs)
Working principle, construction, types, and applications.

UNIT-VII: Power Factor Correction : (4 Hrs)
Significance of power factor**,** Causes of low Power factor disadvantages, methods of Power factor improvement (Numerical treatment)

UNIT-VIII: Electrical Devices – Instruments: (6 Hrs)
Electromagnetic relay , induction relay contactors , Potential transformer, current transformer , auto – transformer , miniature Circuit Breaker (MCB), Earth Leakage Circuit Breaker(ELCB) ,Dynamometer type wattmeter ,.

Text Books:

1. B.L Theraja 'Electrical technology'- Vol – I ,II- S.Chand & Company Ltd.
2. H.Cotton 'Electrical technology'- VIIth Edition- Wheerlers Publishing,New Delhi .

Reference Books:

1. S. L Uppal 'Electrical power'-XIth Khanna Publication
2. H. Partab-' Art & Science of utilization of electrical energy '–
3. I.J Nagrath & M. Gopal 'Control Systems Engineering'- Vth Edition –Prentice Hall of India.
4. D.P. Kothari, I.J. Nagrath 'Elecric Machines' IIIrd Edition – Tata Mc Graw Hill Publication.

List of Practicals (Minimum 8)

1. Study of Speed control of DC shunt motor by armature voltage control .
2. Study of Speed control of DC shunt motor by flux control .
3. Study of Brake load test on DC shunt motor .
4. Study of Load test on 3- phase induction motor .
5. Study of Active & reactive power measurement by two wattmeter method.
6. Study of synchros.
7. Study of Speed – torque characteristics of AC Servo motor.
8. Study of three phase transformer connections.

9. Study of D.C motor starters.
10. Study of three phase induction motor starters.

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S.E. (Electronics Engineering)
Semester- III

ELECTRONIC CIRCUIT ANALYSIS AND DESIGN – I

Teaching Scheme: **Examination Scheme**: Lecturers : 4 hr/week
Theory : 100 marks
Practical : 2 hr/week
Term Work : 25 marks
Tutorial : 1 hr/week
POE : 50 marks

Section-I

UNIT-I: Unregulated Power Supplies: (8 Hrs)
Specification and ratings of diodes (P-N junction, Zener and power diode) and transistor (low power, high power & switching) .
Rectifiers: Half wave, full wave: center tap and bridge type, analysis for different parameters: PIV, TUF, efficiency, ripple factor, regulation, etc.
Filters: Need of filters, Types: capacitor, inductor, LC, CLC, Analysis for ripple factor and regulation.
Design of unregulated power supply with and without filter.

UNIT-II: Voltage Regulators : (8Hrs)
Need of voltage regulator, Stabilization factors, Analysis & Design of
Shunt regulator (using Zener diode & BJT), series voltage regulator (using BJT)
Series voltage regulator with Pre- regulator & Overload protection circuit.

UNIT-III: Transistor Biasing : (8Hrs)
Need of biasing, DC load line analysis, operating point, thermal runaway. Different biasing circuits: fixed bias, collector to base bias & voltage divider bias. Stability factor, General expression for stability factor, stability factor for all biasing circuits. Design of biasing circuits, Compensation techniques: Thermistor and diode compensation

Section-II

UNIT-IV: Voltage Amplifiers:- (10 Hrs)
H-Parameters, Hybrid model for transistor (CE, CB& CC configuration), Generalized H-parameter analysis of transistor amplifier for Voltage Gain, Current gain, Input resistance & Output resistance taking Rs into account, approximate H-parameter model for CE,CB & CC. Classification of voltage amplifiers, Detailed study of Single stage RC coupled amplifier & Emitter follower. Analysis for voltage gain, current gain, input resistance & Output resistance. Design of single stage RC coupled amplifier & Emitter follower.

UNIT-V: Frequency response of single stage RC coupled amplifier: (8Hrs)
Low frequency response: Effect of emitter bypass capacitor(C_E) & Coupling capacitor(C_C), 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)

UNIT-VI: Feedback Amplifiers : (6Hrs)

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

Text Books:

1. Allen Mottershed –'Electronic devices & circuits'-Prentice- Hall India
2. J. Millman & C.Halkias -'Electronic devices & circuits'-IInd Edition- Tata McGraw Hill Publication
3. N.C. Goyal & R.K. Khetan-' A Monograph on Electronics Design Principles'-Vth Edition-Khanna Publishers

References Books:

1. David A. Bell –'Electronic devices & circuits'- IVth Edition- Prentice- Hall India
2. Robert L. Boylsted, Louis Nashelsky- 'Electronic devices & circuit theory'- (IXth edition)- Pearson Education
3 National Semiconductor Data Manual.

List of Experiments (Minimum 10)

1. Study of ratings of Electronic components and lab. Equipments.
2. Design & analysis of Half wave rectifier(HWR) with & without filter by calculating performance parameters
3. Design & analysis of Full wave rectifier(FWR) with & without filter by calculating performance parameters
4. Design & analysis of Bridge rectifier with & without filter by calculating performance parameters
5. Design & analysis of Zener shunt regulator.
6. Design & analysis of Transistorized shunt regulator.
7. Design & analysis of series pass regulator with & without pre- regulator.
8. Design & analysis of Voltage divider biasing circuit.
9. Determination of H-parameters from transistor CE characteristics.
10. Calculation of performance parameters (Av, Ai, Ri, Ro) for single stage RC coupled amplifier.
11. Study of Frequency response of single stage stage RC coupled amplifier.
12. Study of square wave response of RC coupled amplifier & calculation of Sag & rise time (t_r).
13. Comparative study of voltage amplifiers (with & without feedback).
14. Design & analysis of voltage series feedback amplifier.

Note for paper setter:

- Question paper shall consist of approximately 60% analysis & design based problems and approximately 40% theory should be covered.

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S.E. (Electronics Engineering)
Semester-III

NETWORK ANALYSIS

Teaching Scheme:
Lecturers: 4 hr/week
Tutorial : 1 hr/ week

Examination Scheme:
Theory : 100 Marks
Term Work : 25 Marks

Section -I

UNIT-I: Network Fundamentals : **(6 Hrs)**
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.

UNIT-II: Network Theorems: **(8 Hrs)**
Superposition Theorem, Millman's Theorem, Compensation Theorem
Norton's Theorem, Thevenin's Theorem, Maximum Power Transfer Theorem,
Reciprocity Theorem.

UNIT-III : Two port network & Network functions: **(10 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 .
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,G & α 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-Harwitz criterion , pole zero diagram.

Section -II

UNIT-IV : Resonance : (7 Hrs)

Defination , Types: series & parallel resonance.

Series resonance- resonant frequency, variation of impedance, admittance, current & voltage across L & C w.r.t. 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.

UNIT-V: Filters & Attenuators: (10 Hrs)

Definitions, classification & characteristics of different filters, filter fundamental such as attenuation constant (α) , phase shift (β) propagation constant (γ) characteristic impedance (Zo) , decibel ,neper.

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

Attenuators - Definitions, classification , relation between neper & decibel . Analysis & design of T type, Π type , α Lattice , bridged- T & L types attenuators

UNIT-VI : Transient Response: (6 Hrs)

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

Term Work: (Minimum 10 tutorials):

Minimum 10 tutorials based on above syllabus covering all units.

Text book :

1 .A. Sudhakar ,Shyammohan S.Palli 'Circuit & Network – Analysis & Synthesis' IIIrd Edition – Tata McGraw Hill Publication

2. D. Roy Choudhury 'Networks & Systems' - New Age International Publisher

Reference books:

1. A.Chakrabarti 'Circuit Theory (Analysis & Synthesis)' - IIIrd Edition Dhanpat Rai & co

2. M.E.Van Valkenburg ' Network Analysis' - IIIrd Edition , Pearson Education / PHI

3. Josheph Edministrar 'Theory & Problems of Electronic Circuit (Schaum's series) – Tata Mc Graw Hill, Publication.

4. Soni Gupta 'Electrical Circuit Analysis' Dhanpat Rai & Co.

5. Boylestad 'Introductory Circuit Analysis – Universal book stall, New Delhi.

Note for paper setter:

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

Shivaji University, Kolhapur.
Revised Syllabus w.e.f. Academic Year 2008-09

S.E. (Electronics Engineering)
Semester -III

DATA STRUCTURES & ALGORITHMS

Teaching Scheme:
3hr/week
Tutorial : 1hr/week

Examination Scheme: Lectures:
Theory : 100 Marks
Term Work : 25 marks

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, space 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, cicular, double ended, priority, 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. ISRD group –'Data structure using C '–- Tata McGraw Hill
2. Seymour Lipschautz –'Data structures' - Shaum's outlines -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)

Term Work : Tutorial (Minimum 12 tutorials based on 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**

Note: Tutorial should consist only algorithms.

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SE (Electronics Engineering)
Sem-III

PROGRAMMING LABORATORY

Teaching Scheme:	**Examination Scheme:**
Lecturers: 2hr/week	POE : 50 marks
Practical: 2hr/week	Term Work: 25 marks

UNIT-I: Introduction: (4 Hrs)
Object oriented programming [C++], applications of OOP & C++, dynamic initialization of variables, storage classes. Functions in C++, function prototype, call & return by reference, inline function, Default & Const argument.

UNIT-II: Classes & Objects: (2 Hrs)
Specifying class, defining member function, making an outside function inline, Nesting member function, private member function, Arrays within a class, memory allocation for objects, Array of objects, pointer to members.

UNIT-III: Constructors and Destructors: (4 Hrs)
Constructors, parameterized and multiple, constructors with default arguments, Dynamic initialization of objects (*new, delete*) copy constructor, dynamic constructors and destructors.

UNIT-IV: Polymorphism & Inheritance: (5 Hrs)

Function overloading, Unary & binary operator overloading, manipulation of strings using operators. Friend function & friend class.
Single, multiple, multilevel, Hybrid, Hierarchical inheritance, virtual base classes, Abstract classes.

UNIT-V: Pointers: **(3 Hr)**
Pointers to objects, ***this*** pointer, pointer to derived classes

UNIT-VI: File Handling : **(4 Hr)**
Classes for file stream operations, opening and closing of files, file modes, file pointer & their manipulations, sequential I/O operations.

UNIT-VII: Graphics : **(2 Hr)**
Introduction to graphics.

Text Book:
1. E Balgurusamy –'Object oriented programming with C++' -, IInd Edition- Tata Mc- Graw Hill Publication

Reference Book:
1. Herbert Schildt –'The Complete Reference C++' - IIIrd Edition - Tata McGraw Hill Publication
2. Ravichandran D.-'Programming with C++ '-IInd Edition- Tata McGraw Hill Publication
3. Robert Lafore –'C++ Programming' –. IV th Edition –Techmedia, New Delhi.

Term Work :-

A] Minimum 8 programs based on

1. Classes & objects	-	1
2. Constructors &Destructors	-	1
3. Copy Constructor	-	1
4. Unary operator overloading	-	1
5. Binary operator overloading	-	1
6. Function overloading	-	1
7. Friend function	-	1
8. Friend class	-	1
9. Inheritance	-	2
10. Pointers and virtual function	-	1
11. File handling	-	1
12. Graphics.	-	1

B] Mini project based on data structures, file handling, graphics and it should be carried out by a group of *two* students only.

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S.E. (Electronics Engineering)
Semester-IV

ELECTRONIC CIRCUIT ANALYSIS & DESIGN--II

Teaching Scheme: Lecturers: 4 hr/week
Practical: 2 hr/week

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

Section – I

UNIT –I: Wave shaping circuits: (7Hrs)
Low pass & high pass RC circuits (square & step response), High pass RC circuit as a differentiator, Low pass RC circuit as integrator.
Clipping circuits: Classification, diode clippers transistor clippers, Transfer characteristics, Design & analysis of clipper circuits.
Clamping circuits: Classification, clamping operations, Clamping circuit theorem, practical clamping circuits,
Voltage multipliers: Doubbler, Trippler & Qudrappler circuits.

UNIT –II: Multi Stage Amplifier : (6Hrs)
Need of cascading, Parameter evaluation such as Ri , Ro, Av, Ai & Bandwidth for general multi stage amplifier ,Analysis & design at low frequency & mid frequency of RC coupled, direct coupled & voltage series feed back (Two stage) amplifier.

UNIT –III: Power Amplifiers : (7Hrs)
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.
Class A single ended transformer coupled amplifier& class A Push pull amplifiers analysis and design, Class B amplifier & class B push pull amplifier analysis & design, crossover distortion, class AB Push pull amplifiers analysis and design
Complementary symmetry power amplifier.

UNIT–IV: FET & MOSFET: (6Hrs)
Biasing of JFET, Common source FET amplifier at low and high frequency- analysis and design.
MOSFET-construction, characteristics and comparative study of Enhancement and Depletion MOSFET (P-channel & N-channel),Handling precautions of MOS devices, ratings and specifications of MOS,CMOS inverter.

Section – II

UNIT –V: Oscillators: (8Hrs)
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.

UNIT –VI: Multivibrators : (9Hrs)

Transistor as a switch, Different transistor switching parameters, classification of multivibrators, Analysis and design of Astable, Monostable, Bistable multivibrator and Schmitt trigger using BJT. Design of triggering circuits for Multivibrators

UNIT –VII : IC regulators : (5Hrs)

Study and design of regulators using IC's :78XX,79XX,723,LM317,
Switching regulator: Introduction, study of LM3524.

Text Books:

1. J. Millman & C.Halkias -'Electronic devices & circuits'-IInd Edition- Tata McGraw Hill Publication
2. Allen Mottershed –'Electronic devices & circuits'-Prentice- Hall India
3. N.C. Goyal & R.K. Khetan-' A Monograph on Electronics Design Principles'-Vth Edition-Khanna Publishers
4. J. Milman & H. Taub ' Pulse Digital & Switching Waveforms'
   - IInd Edition- Tata McGraw Hill Publication

References Books:

1. David A. Bell –'Electronic devices & circuits'- IVth Edition- Prentice- Hall India
2. J Millman & A. Grabel-' Microelectronics'- IInd Edition- McGraw Hill International Editions
3 National Semiconductor Data Manual.
4 M.S. Roden, G.L. Carpenter ' Electronic Design- From Concept to reality'-IV th Edition-Shroff publisher & Distributors

Term Work:

List of experiments (Minimum 10)

1. a Study of RC low pass filter as an integrator
   b. Study of frequency response of low pass filter
2 a. Study of RC high pass filter as an differentiator
   b. Study of frequency response of high pass filter
3. Design of different clipper circuits
4. Study of different clamper circuits: positive, negative & bias
5. Design & study of Frequency response of two stage RC coupled amplifiers
6. Study of power amplifiers
7. Design of astable multivibrators
8. Design of monostable multivibrators
9. Design of bistable multivibrators
10. Design of Schmitt trigger
11. Design of Wein bridge oscillator using BJT.
12. Design of RC phase shift oscillators using BJT/ FET.
13. Design of Collpitt's oscillators using BJT
14. Design of Hartly oscillators using BJT
15. Study of Frequency response of Common Source(CS) amplifier

Note for paper setter:

- Question paper shall consist of approximately 60% analysis & design based problems and approximately 40% theory should be covered.

Shivaji University, Kolhapur.
Revised Syllabus w.e.f. Academic Year 2008-09

S.E. (Electronics Engineering)
Semester- IV

ANALOG COMMUNICATION

Teaching Scheme:
Lecturers : 4 hr/week
Practical : 2 hr/week

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

Section-I

UNIT-I: Introduction : (5 Hrs)
Block schematic of communication system, base band signals, RF bands, Necessity of modulation, types of modulation – AM, FM, PM and Pulse Modulation. Noise types, Noise figure. Introduction to radio wave propagation, ground wave, space wave and sky wave.

UNIT-II: Amplitude Modulation : (7 Hrs)
Amplitude Modulation principles, AM envelope, frequency spectrum & BW, phase representation of AM wave, Modulation index, % modulation (Numericals expected)
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)

UNIT-III: Angle Modulation: (10 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 ,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: Pulse Modulation : (8 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-V: AM Receiver: (7 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-VI: 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 , Antenna: basic consideration radiation, Radiation mechanism, Elementary doublet.

UNIT-VII: Antennas : (5 Hrs)

Introduction, Basic Antenna operation, Antenna reciprocity**,** Antenna co-ordinate system & radiation patterns , Antenna gain ,captured power density, Antenna captured area & power, Antenna polarization , beam width , BW, input impedance , Basic antenna: 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.

Reference Books:

1. R P Singh, S D Sapre 'Communication System-Analog & Digital' IInd Edition –Tata Mc Graw Hill Publication
2. Dennis Roddy, John Coolen.'Electronics Communications 'IVth Edition- Pearson Education

Term Work:

List of Experiments (Minimum 10):

1. Study Of Amplitude Modulation (A.M.)
2. Study Of AM Detection.
3. Study Of AM Receiver Characteristics.(Sensitivity, Selectivity & Fidelity)
4. Study Of Frequency Modulation.(F.M.)
5. Study Of FM Demodulation.
6. Sampling And Reconstruction.
7. Study Of Pulse Amplitude Modulation (PAM.)
8. Study Of Pulse Width Modulation.(PWM)
9. Study Of Pulse Position Modulation.(PPM)
10. Study Of PAM-TDM.
11. Study Of Antenna Parameters.
12. Study Of SSB Modulation & Demodulation.
13. Study Of DSB Modulation & Demodulation.
14. Visit To AIR (AM/FM).

Note:

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

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Revised Syllabus w.e.f Academic Year 2008-09

SE (Electronics Engineering)
Semester -IV

SIGNALS & SYSTEMS

Teaching Scheme: Lecturers : 3 hr/week
Tutorial : 1hr/week

Examination Scheme:
Theory : 100 Marks
Term Work: 25 Marks

Section-I

Unit-I: Introduction to Signals: (6 Hrs)
Definition of signals, classification of signals: continuous time signals & discrete time signals, even & odd signals, periodic & non-periodic , deterministic & non-deterministic, energy & power, elementary signals: unit impulse, unit step, unit ramp, exponential & sinusoidal , basic operations on signals.

Unit-II: Sampling Theorem & System: (4 Hrs) Sampling theorem, aliasing, reconstruction of sampled signals, interpolation.
System: Definition, Classification, Linear & Nonlinear, Time invariant & Time variant, Causal & Non causal, Static & Dynamic, Stability, Invertibility.

Unit-III: Linear Time Invariant (LTI) System Analysis : (8 Hrs)
Impulse response of continuous & discrete time signals, Convolution integral & convolution sum, Properties of convolution: Distributive, Commutative & Associative.

Section-II

Unit-IV: Fourier Series for Continuous Time & Discrete Time: (6 Hrs)
Continuous time & discrete time Fourier series: development Fourier of Series, derivation, properties of Fourier series: linearity, time shifting, frequency shifting, time reversal, time scaling, time differentiation & time integration, multiplication , convolution

Unit-V: Continuous Time & Discrete Time Fourier Transform: (6 Hrs)
Basic concept of Fourier transform of functions: rectangular, impulse, signum. Properties of Fourier transform: linearity, time shifting, frequency scaling, time scaling, multiplication, and convolution.

Unit-VI: Z transform: (6 Hrs)
Introduction of Z-transform, ROC, properties of ROC, Unilateral Z-transform, properties of Z-transform: linearity, time shifting, time reversal, time scaling, convolution, differentiation, multiplication, Parsevals theorem, initial value & final value theorem. Inverse Z-transform: PFE method, long division method, residue method, convolution method.

Text Books:

1. Simon Haykin, Barry Van Veen- 'Signals & system' - IInd Edition Wiley publication
2. Michael J. Roberts.-'Fundamentals of signals & systems'- Tata McGraw Hill, 2007.

Reference Book:

1. Alan V. Oppenheim, Alan S. Wilsky, S. Hamid Nawab -'Signals & system' -IInd Edition - Pearson Education.
2. H.A HSU, 'Signals & system' (Schaum's out lines), Tata McGraw Hill
3. Smarajit Ghosh, 'Signals & system' Pearson Education.
4. Charles L. Philips, John M. Parr, Eve A. Rislein 'Signals, system & transform' , IIIrd Edition, Pearson Education.
5. Ramesh Babu 'Signals & system' , SciTech Publication.

Term work:

Term work shall consist of minimum 12 assignments, out of which minimum 05 problems to be solved on graph paper.

Note for paper setter:

- Question paper shall consist of approximately 75 % numerical problems & approximately 25% theory should be covered.

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Revised Syllabus w.e.f. Academic Year 2008-09

S.E. (Electronics Engineering)
Semester-IV

DIGITAL DESIGN

Teaching Scheme:
Lecturers: 4hr/week
Practical : 2hr/week

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

Section-I

UNIT-I: Binary Arithmetic & Codes: (4Hrs)

Binary arithmetic operations: addition, Subtraction, multiplication, Division of binary numbers, Subtraction using 2's complement method.
Binary codes: weighted and non weighted codes, self complementary codes, BCD, Excesses-3, Gray codes, error detecting and correcting codes, hamming codes, alphanumeric codes, ASCII Codes.

UNIT- II: Boolean Algebra: (4Hrs)

Boolean Laws and Expression using Logic Gates, Realization of different gates using Universal gates, De-Morgan's Theorem, Duality Theorems.
Standard forms: SOP, POS, Simplification of Switching function & representation (Maxterm & Minterm), Boolean expression & representation using logic gates, Propagation delay in logic gate.

UNIT- III: Boolean Function Reduction Techniques : (8Hrs)

Karnaugh map: K-map Format up to 4 variables, mapping and minimization of SOP and POS expression, Don't care condition, conversion from SOP to POS and POS to SOP form using K-map, minimization of multiple output circuits,

Quine: Mc-cluskey method (up to 4-variable)- minimization technique, prime implicant table, Don't care condition.

Timing Hazards: static Hazards, Dynamic Hazards, Designing Hazards free circuits.

UNIT- IV: Combinational Circuits Design : (8Hrs)

Adder & Subtractor(Half and Full), Parallel Binary adder, BCD Adder, Binary multipliers, Code Converters, parity bit generator, Comparators, , Decoder, BCD to 7-segment Decoder ,Encoders, Priority encoders, Multiplexers, De- Multiplexers

Section-II

UNIT V: Sequential Circuits Elements: (12Hrs)

Flip-flop & Timing Circuits: SR latch, Gated latch, Edge triggered flip-plop:- D, JK, T Flip-flop, flip-flop asynchronous inputs ,characteristic table of Flip-flop, excitation table of Flip-flop, , master slave JK flip flop, inter conversion of Flip-flop.

Study of timing parameters of flip-flop: clock to Q, setup time, hold time, timing parameters of flip-flop asynchronous input.

Shit resistor: buffer register, controlled buffer register.

Data transmission in shift resistor SISO, SIPO, PISO, PIPO, Bidirectional shift resistor universal shift resistor.

Counter: Classification, Ripple or asynchronous counter, Effect of propagation delay in ripple counters, up-down counter, Mod-n counter, synchronous counter, Ring counter, Johnson counter.

UNIT-VI: Sequential Circuits Design: (8 Hrs)

Sequential circuit block diagram, Mealy Machine, Moore Machine, state Diagram, State assignment, state reduction. State table, design procedure synthesis using various flip flops, application of sequential circuits, synchronous counter design overlapped and non over lapped sequence detector, Worst case time estimation of sequential circuits.

UNIT-VI: Logic Families: (4 Hrs)

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

Text Books:

1. A. Anand Kumar 'Fundamentals of Digital Circuits'--. PHI
2. M. Morris Mano 'Digital Design'-- (Third Edition),. PHI

Reference Books:

1. Willim I. Fletcher.'An Engineering Approach to Digital Design'—PHI/ Pearson
2. Norman Balabanian Bradle Carlson. 'Digital Logic Design Principals,.' Wiley Publication.
3. Rajkamal 'Digital Systems Principals and Design'—Pearson
4. A.P. Malvino, D.P. Leach 'Digital Principles & Applicatios' -VIth Edition-Tata Mc Graw Hill, Publication.
5. R.P. Jain-'Modern Digital Electronics' IIIrd Edition- Tata Mc Graw Hill, Publication.

Term Work:

List of Experiments: [Minimum 10]

1. Study of basic gates using TTL, CMOS: 7432, 4011,4050, 4070,4071,40106
2. Study of Static I/O and transfer Characteristic of TTL.
3. Study of Static I/O and transfer Characteristic of CMOS.
4. Study of Universal gates (NAND, NOR)
5. K map based implementation of combinational logic
6. Half and Full Adder, Half and Full Subtractor
7. 4 bit Adder subtracor using IC 7483
8. Code Converters (Binary to Gray, Excess 3 to Binary)
9. Comparator using IC 7485
10. Implementation of combinational logic using MUX
11. Study of Decoder and DEMUX (IC 74138)
12. Study of 7 segment decoder driver. (IC 7447)
13. Study of Flip Flops (SR FF, D FF, JK FF, T FF)
14. Design Built and test MOD N counter
15. Design Built and test Shift Register
16. Design and implementation of Johnson Counter
17. Design 3 bit sequence detector

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S.E. (Electronics Engineering)
Semester- IV

ELECTRONIC MEASUREMENT AND INSTRUMENTATION

Teaching Scheme:
Lecturers: 3 hr/week
Practical: 2 hr/week

Examination Scheme:
Theory : 100 Marks
Term Work: 25 Marks

Section-I

UNIT- I: **Introduction to Measurements Systems and Measuring Instruments:** **(7 Hrs)**

Measurements, significance of measurements, methods of measurements- Direct & indirect method, elements of generalized measurement system, measurement system performance, Performance characteristics- static and dynamic characteristic, Errors- Types & source of error.
Digital voltmeters- Introduction, Dual Slope Integrating type DVM, Integrating type DVM & successive approximation principles, general specifications of DVM, digital multimeter, digital measurements of time, digital frequency meter, stroboscope, Q meter,

UNIT-II: Transducers : **(7 Hrs)**

Definition, classification, transducer selection, different types of transducers, strain gauges, RTD, thermistor, thermocouple, semiconductor diode temperature sensor, LVDT, capacitive transducers, piezoelectric transducer, photovoltaic cell, LDR,
Elastic pressure transducer – bellows, bourdon tubes, diaphragm, speed measurement using magnetic and photoelectric pickup

UNIT-III: AC and DC Bridges : (5 Hrs)

DC bridges: Introduction , wheatstone's bridge, Kelvin bridge, guarded Wheatstone bridge,
AC bridges : Condition for bridge balance .Maxwell bridge , Hay bridge, Schering bridge, wein bridge, Wagner ground connection (Numericals are expected), Bolometer & RF power measurement.

Section-II

UNIT- IV: Oscillosope & Display Devices: (7Hrs)

Preview of CRO, Basic principle, CRT, horizontal and vertical deflection system (analytical treatment expected), delay line & types, Types of CRO: Dual Bean, Dual Trace, sampling, Digital storage, digital readout, measurement of phase and frequency using Lissajous pattern, CRO probes: active, passive, current, attenuators: uncompensated & compensated type
Display devices: Digital display system, classification of display, display devices & principle: LED,LCD,Dot matrix printer.

UNIT-V: Signal Generators and Analyzers : (6 Hrs)

Signal generators: Function generators, Sweep, pulse and square wave generator.
Wave Analyzers: Introduction, basic wave analyzer, heterodyne harmonic distortion analyzer, spectrum analyzer, Digital Fourier analyzer, logic analyzer, Wobbluscope.

UNIT-VI: Data Acquisition System and Conversion: (6 Hrs)

Introduction ,Objective of DAS, Signal Conditioning of inputs ,Single channel & Multichannel DAS, data conversion, Sample and hold, digital transducers.
DAC concepts: Binary weighted DAC, R-2R ladder circuit DAC
ADC concept: flash, single slope, dual slope, stair case Ramp ADC, successive approximation ADC, Data Loggers.

Text Books

1. H .S. Kalsi 'Elecronic Instrumentation' – 2nd edition --Tata McGraw Hill Publication
2. A. D. Helfrick , W. D. Cooper ' Modern Electronic Instrumentation and Measurement Techniques'-- Pearson Education

Reference Book:

1. A.K.Sawhney 'A Course in Electrical & Electronics Measurement & Instrumentation.' --11th Edition, 1996 --Dhanpat Rai & sons
2. C.S. Rangan ,G.R. Sharma , V.S.V. Mani 'Instrumentation devices and system'— 2nd edition --Tata McGraw Hill Publication
3. B.C.Nakra, K.K.Choudhary 'Instrumentation, Measurement and Analysis' 2nd edition -- Tata McGraw Hill Publication l
4. E.O.Doebeline.'Measurement systems application and design 'Tata McGraw Hill Publication
5. Oliver Cage 'Electronic measurement and instrumentation 'Tata McGraw Hill Publication

Term Work:

List of experiments (Minimum 8)

1. Study of temperature transducers: (Any two)
   a) RTD
   b) Thermocouple
   c) Thermistor
2. Study of displacement transducers: (Any two)
   a) Inductive
   b) Capacitive
   c) Resistive
3. Study of weight measurement using strain gauge:

4. Study of speed measurement using : (Any one)
    a) Magnetic pick up
    b) Photoelectric pick up
5. Study of AC and DC bridges: (Any two)
    a) Wheastones' bridge
    b) Maxwell's bridge
    c) Wein bridge
6. Measurement of frequency and phase using Lissageous patterns
7. Study of digital storage oscilloscope
8. Study of spectrum analyzer
9. Study of pressure measurement using bourdan tube
10. Study of DAC using R-2R ladder network

Shivaji University, Kolhapur.
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S.E. (Electronics Engineering)
Semester -IV

Circuit Simulation

Teaching Scheme: **Examination Scheme:** Lecturers:
1hr/week Term Work: 25 Marks Practical : 2hr/week

UNIT-I: Schematic Design: **(4 Hrs)**
Introduction, Description of P-Spice, Types of analysis, Description of simulation software tools (like OrCAD / PROTEL / Proteus / Microcap)
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.

UNIT-II: Simulation: **(4 Hrs)**
Types of Analysis: Bias point, Time domain, AC Sweep, DC Sweep, Parametric, Monte Carlo, Noise analysis.

UNIT-III: PCB Design: **(4 Hrs)**
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.

Text book:
1. M. H. Rashid 'Introduction to P-spice using OrCAD for circuits and Electronics' –Pearson Education

Reference Books:
1 . User manuals of PROTEL, PROTEUS, OrCAD, Microcap
2.. W.C. Bosshart 'Printed Circuit Boards-Design & Technology'–Tata McGraw-Hill Publication.

List Of Experiments :

Sr. No.	Title of the Experiment
1	Schematic drawing & component symbol creation
2	Hierarchical schematic drawing
3	Simulation and analysis (bias point analysis, time domain, AC sweep, DC sweep, parametric) of :RLC Circuit
4	Simulation and analysis (bias point analysis, time domain, AC sweep, DC sweep, parametric) of : Transistorized Circuit
5	Simulation and analysis (bias point analysis, time domain, AC sweep, DC sweep, parametric) of : Two Stage Amplifier
6	Simulation and analysis (bias point analysis, time domain, AC sweep, DC sweep, parametric) of : IC Based Circuits
7,8,9	Experiments based on PCB design which would include component placement, setting design rules, auto routing and interactive routing.
10	Experiments based on noise analysis and Monte-carlo analysis

Note: Experiments may be based on the software's like OrCAD / PROTEL/ PROTEUS / MULTISIM etc.

Equivalence of Subject S.E. Part-I & II under the Faculty of Engineering & Technology w.e.f. Academic Year 2008-09

Part-I (Semester-III)

Sr. No.	S.E. Part-I Pre-revised	S.E. Part-I Revised
1	**Engineering Mathematics -III**	**Engineering Mathematics -III**
2	**Electrical Machines**	**Electrical Machines**
3	**Linear Circuits**	**Network Analysis**
4	**Electronics Devices & Circuits**	**Electronic Circuit Analysis & Design-I**
5	**Digital System**	**Digital Design (SE Part-II)**
6	**Programming Technique (Term Work only)**	**Programming Laboratory(Term Work only)**

Part-II (Semester-IV)

Sr. No.	S.E. Part-II Pre-revised	S.E. Part-II Revised
1	**Electronic Circuit Design**	**Electronic Circuit Analysis & Design-II**
2	**Communication Engineering-I**	**Analog Communication**
3	**Electronic Measurement & Instrumentation**	**Electronic Measurement & Instrumentation**
4	**Signals & Systems**	**Signals & Systems**
5	**Linear Integrated Circuits**	**Integrated Circuits & Application/ Data Structures & algorithms (SE Part-I)**
6	**Computer Aided Design (Term work only)**	**Circuit Simulation (Term work only)**