UNIVERSITY OF MUMBAI

Revised Syllabus

And Scheme of Examination

For

The Second Year

(Sem. III & IV)

Of the

B.E. Degree Course

In Electronics Engineering

(With effect from the academic year 2008-2009)

UNIVERISITY OF MUMBAI
SCHEME OF INSTRUCTIONS & EXAMINATION
BE (ELECTRONICS ENGINEERING)

SEMESTER-III

Sr. No.	Subjects	No. of Periods per Week			Marks				
		Lectures	Practicals	Tutorials	Theory Paper	Term Work	Practical	Oral	Total
1.	Engineering Mathematics	4	-	1	100	25	-	-	125
2.	Basic of Electronic Circuits	4	2	-	100	25	50	25	200
3.	Digital System Design I	4	2	-	100	25	50	25	200
4.	Electrical Network Analysis and Synthesis	4	2	-	100	25	-	-	125
5.	Control System	4	2	-	100	25	-	25	150
6.	Presentation and Communication Techniques	2	-	02	-	50	-		50
Total		22	08	03	500	175	100	75	850

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SEMESTER IV

Sr. No.	Subjects	No. of Periods per Week			Marks				
		Lectures	Practicals	Tutorials	Theory Paper	Term Work	Practical	Oral	Total
1.	Advanced Engineering Mathematics	4	-	-	100	-	-	-	100
2.	Electronic Circuit Analysis & Design	4	2	-	100	25	50	25	200
3.	Digital System Design -II	4	2	-	100	25	50	25	200
4.	Basics of Analog and Digital Communication Systems	4	2	-	100	25	-	25	150
4.	Electronic and Electrical Measuring Instrument and Machine	4	2	-	100	25	-	25	150
5.	Electronic Workshop-I	-	4	-	-	25	-	25	50
6.									
Total		20	12	-	500	125	100	125	850

S.E. ELECTRONICS – SEMESTER – III

ENGINEERING MATHEMATICS

Lectures : 4 Hours/week Paper: 100 Marks
Duration 3 Hours
Tserm work -25

	Detailed Syllabus	Lectures/ Week
1	1.Laplace Transform: 1.1 Existence of Laplace transform, properties of L.T.1st and 2nd shifting theorem, change of scale properties, unit step function, Heavi side, Dirac delta and periodic function and their L.T. 1.2 Inverse L.T. with partial fraction and convolution theorem 1.3 Applications to solve initial and boundary value problems involving O.D.E.	06 05 02
2	Fourier series Dirichlets conditions, fourier series of periodic function with period 2Π and 2 l f.s. for even and odd functions Half range sine and cosine and parseval's identity.	07
3	3.1 Complex form of fourier series 3.2 Forier integral and fourier transform with properties in detail Lect.03	02 03
4	Matrices 4.1 Types of matrices, Adjoint, inverse and rank of a matrix. Normal form of a matrix 4.2 System of Homogeneous and non homogeneous equations and their consistency	06
5	Complex variables 5.1 Analytic function-R equation in Cartesian and polar form. Analytic function by Milne-Thompson method, harmonic function. 5.2 Conformal mapping, Bilinear mapping and standard transforms.	06 04
6	Z-transform & vector analysis 6.1 Properties, change of scale, shifting, inverse of z transform. 6.2 Initial value and final value 6.3 Vector integration, scalar potential work down Greens theorem. Divergence theorem, strokes theorem (without proof)	04 03 08

Theory Examination:

1. Question paper will comprise of total 7 questions, each of 20 marks
2. Only 5 question need to be solved.
3. Question I will be compulsory and based on entire syllabus.
4. Remaining question will be mixed in nature (for example q.2a) from 2.1 then b) will be from 4.1 or 5.1 other than 2.1.
5. In question paper weightage of each chapter will be proportional to number of respective lecture hours mentioned in the syllabus.

Recommended Books:

1. P.N.Wartikar / J.N.wartikar, text book applied mathematics, Vol I & II, Pune Vidyarthi griha prakashan.
2. Matrices by Shantinayan
3. Vector analysis by Murray R.stiegel, Shaum series
4. Higher Engg. Mathematics Dr.B.S.Grewal, Khanna Publication
5. Higher Engg.mathematics by B.V.Ramana tata mcgraw-hill publishing company limited.
6. Advanced Engg. Mathematics by C.Ray wylie & Louis, C.Barrott tata mcgrawq-hill publishing company limited
7. Advanced Engg. Mathematics 8^{th} Ed Erwin kreysizg. John Wiley & Sons, inc

S.E. (ELECTRONICS) SEMESTER III
Basic of Electronic Circuits

Lectures: 4 hours / Week	**Theory Paper: 3 hours and 100 marks**
Practical 2 hours / Week	**Termwork: 25 marks Oral :25 marks**
Term work : 25 marks	**Practical : 3 hours 50marks**

	Detailed Syllabus	Lectures/ Week
1	**Semiconductor Materials and Diodes** Review of semiconductor Materials and Properties, The PN Junction. Introduction to Semiconductor Diode Theory. Diode Circuits: DC Analysis and Models, AC Equivalent Circuits, Other Diode Types – Solar Cell, Photodiode, Light-Emitting Diode, Schottky Barrier Diode, Pin Diode, Zener Diode, Zener as voltage Regulator, Temperature Effects, Understanding Manufacturer's Specifications.	06
2	**Diode Circuits** Design of Rectifier Circuits:- Full Wave Rectification with 'C', L-C & 'pi' filter, Ripple-Voltage and Diode Current, Voltage Doubler & Multipliesr Circuit, Zener Diode Circuits, Clipper and Clamper Circuits. Multiple-Diode Circuits. Photodiode and LED Circuits.	08
3	**The Bipolar Junction Transistor** Basic bipolar junction transistor, PNP & NPN transistor structures device symbols. Current - Voltage Characteristics, Transistor Biasing – Single Base Resistor Biasing, Voltage Divider Biasing and Bias Stability, DC analysis of Transistor Circuits in Common Emitter Common Base and Common Collector configurations, Forward- active Mode Operation Load Line considerations, Non ideal Transistor Leakage Currents and Breakdown, Integrated Circuit Biasing, Multistage Circuits. Transistor Applications – As a Switch.	08
4	**Basic BJT Amplifiers** The BJT Linear Amplifier, Graphical Analysis and AC Equivalent Circuit, Small Signal Hybrid- π , (gm r π) Equivalent Circuit of the Bipolar Transistor, Hybrid – π (gm r π) Equivalent Circuit Including The Early Effect, Expanded Hybrid – Π Equivalent Circuit, Other Small – Signal Parameters And Equivalent Circuits, Basic Transistor Amplifier Configurations I.E. Common Emitter Common Base And Common Collector (Emitter Follower, AC Load Line Analysis. The Three Basic Amplifier Configurations. Summary And Comparison, Design Of Single Stage BJT Amplifier. Multistage Amplifies, Band-Width And Power Considerations, Thermal Considerations In Transistor Amplifiers, Manufacturers Specifications	12

5	**The Field Effect Transistor** Junction Field-Effect Transistor, MOS Field-Effect Transistor, MOSFET, Self Biasing Mid-Point Biasing, Biasing For Zero Drain Current-Drift Potential Divider Biasing And DC Circuit Analysis, Basic MOSFET Applications: Switch, Digital Logic Gate And Amplifier. Temperature Effects In Mosfets, Input Protection Is MOSFET. The Power FET (VMOS).	12
6	**Basic FET Amplifiers** Basic JFET Amplifier Configurations: Common Source Amplifier. The Source Follower (Common Drain) Amplifier. The Common Gate Configurations. Summary Of The Three Basic Amplifier Configurations. AC Circuit Analysis Of Common Source Amplifier. The Source Follower (Common Drain) Amplifier, The Common Gate Amplifier Configurations. Design Of Single Stage JFET Amplifier. MOSFET Amplifier Biasing And DC Circuit Analysis. AC Analysis Of Single Stage MOSFER Amplifier. Single – Stage Integrated Circuit MOSFET Amplifiers, Multistage Amplifiers.	10

Text Books:

1. Donald A. Neamen, Electronic Circuit analysis and design, second edition, Mcgraw Hill International.
2. Robert L Boylestad Louis nashelsky, Electronic devices and circuit theory, sixth edition, pentice lay India.
3. Martin Roden, Gordon Carpenter, William Wieseman, Electronic design, Fourth edtion, shroff publishers
4. Microelectronics Ciruits (Anlysis And Design), By Mohammad Rashid, Cengage Learning.

Reference Books:

1. Electronics Devices And Circuits Theodre F.Bogart, Jr.Jeffrey S.Beasley, Guillermo Rico.
2. Donald Schilling & Charles Belove, Electronic Circuits Discrete And Integrated, Third Edition, Mcgraw Hill.

Termwork:

The termwork shall consist of atleast six laboratory experiments covering the whole of syllabus, duly recorded and graded as well as atleast four computer simulations using EDA tools like PSPICE duly recorded and graded. This will carry a weightage of fifteen marks. A test shall be conducted and will carry a weightage of ten marks.

Suggested List of Experiments

Laboratory / Simulation

1. Application of diodes as a (positive/ negative and both), a clamper (positive/negative).
2. FWR with different types of filters and finding its ripple factor.
3. Voltage regulation using Zener diode.
4. Design and analysis of BJT amplifier with fixed bias, collector bias, potential divider bias. Determinations of its DC operating point.
5. Input and output characteristic of BJT in CB, CC, CE configuration and its parameters.
6. BJT as a Voltage amplifier, determination of its performance parameters (AV, Ai, Ri, Ro).
7. FET as a Voltage amplifier and determination of its performance parameters.
8. Output characteristics and transfer characteristics of JFET, Finding its parameters, mutual conductance and amplification factor.

S.E. (ELECTRONICS) SEMESTER III
Digital Systems Design -I

Lectures: 3 hours / Week	**Theory Paper: 3 hours and 100 marks**
Practicals: 3 hours / Week	**Termwork: 25 marks Oral :25 marks**
Term work : 25 marks	**Practical : 50marks**

	Detailed Syllabus	Lectures/ Week
1	**Introduction to digital Codes:** Analog VS Digital Systems Digital Devices, Binary codes, Gray codes, Character codes, Codes for detecting and correcting errors.	06
2	**Logic Circuits:** Boolean Algebra , theorems, combinational circuit analysis, combinational circuit Synthesis, minimization, Karnaugh Map, Sum of Products, Product of Sums form, and their minimization, Programmed minimization-Quine Mc-Cluskey minimization algorithm, timing hazards – Static and Dynamic Hazards.	14
3	**Combinational MSI, LSI devices:** Combinational design using SSI, MSI devices, Decoders (74x139,74x138), Encoders (74x148), Tri state buffers (74x244,74x245), Multiplexers (74x151), Parity circuits (74180), Comparators(7485), Adders(7483), Subtracrters, BCD adders – subtractors, ALU (74181), Combinational Multipliers, Combinational PLDs	10
4	**Logic families:** Basics of TTL, CMOS, ECL Circuits for basic logic operators just circuits and working of them inall above families. No characteristics of families.	10
5	**Sequential Logic Practices:** Basic Elements, Latches and Flip-Flops, S-R, D.T, J-K Latches And Flip Flops, Conversions, Applications Of Latches Flip-Flop In Switch Debounsing, Bus Holder Circuits, Flip-Flop Timing Considerations And Metastatility.	08
6	**Counters** – Anythronous, Synchronous Counters, Up Down Counters, Mod Counters, Ring Counters Shift Registers, Universal Shift Register.	08

Term work

The term work shall consist of at least eight laboratory experiments covering the whole of syllabus, duly recorded and graded. This will carry a weightage of fiteen marks. A test shall be conducted and will carry a weightge of ten marks.

SUGGESTED LIST OF EXPERIMENTS

The experiments must include:

1. Verification of basic gates (1 Experiment)
2. Application like comparators/parity generators/adders/subtractors etc using gates or MSI devices (2 Experiments)
3. Use of Decoders, Encoders, Multiplexers (2 Experiments)
4. Flip Flop Conversion (1 Experiment)
5. Applications using of Synchronous/Asychronous counters, Shift Registers (2 Experiments)

Text books

1. RP Jain: Modern digital design, forth edition, Tata Mcgraw Hill.
2. Morris Mano, Digital Design, Pearson Education, Asia 2002.

Reference books

1. John F. Wakeley, Digital Design Principles And Practicesthird Edition Updated, Pearson Education, Singapore, 2002.

2. John M.Yarbrough, Digital Logic: Applications and Design, Thomson Brooks/Cole, 2004.

S.E.(ELECTRONICS) SEMESTER-III
Electronic Network Analysis & Synthesis

Lectures: 4 Hours/Week **Theory Paper: 3hours and 100marks**

Practicals: 2 hours/week **Term work : 25 marks**

	Detailed Syllabus	Lectures/ Week
1	**Circuit analysis (ac and de):** Kirchoff's law, Loop variable analysis, Node variable analysis, Source transformations, Reference directions for current and voltage. Active element conventions, dot convention for coupled circuits. Linearity, superposition, The venin's and Norton's maximum power for ac source and dependent source.	12
2	**Linear graphs:** Introductory definitions, The incidence matrix A, the loop matrix B, relationship between sub matrix of A and B. Cut-sets and cut-set matrix. Fundamental cut-sets and fundamental tie- sets, planar graphs, A and B matrices, loop, node, node pair equations duality.	08
3	**Laplace transforms:** Properties of Laplace transforms, basic theorems, Laplace transform of gate function, impulse function and periodic functions, convolution integral, inverse Laplace transform, application of Laplace transforms to solution of network problems.	08
4	**Transient and frequency analysis:** Transient response of R-L, R-C, R-L-C circuits(series combinations only) for d.c. and sinusoidal excitations - Initial conditions - Solution using differential equation approach and Laplace transform methods of solutions, transfer function. Concept of poles and zeros. Concept of frequency response of a system.	10
5	**Two port networks:** Concept of two port networks, Driving point and Transfer functions., open circuit and short circuit parameters, transmission and inverse transmission parameters, hybrid parameters, inter-relationship of different parameters, interconnection of two port networks, T and pi representation, terminated two port networks	08
6	**Fundamentals of network synthesis** Realizability concept, Hurwitz property, positive realness, properties of positive real functions, testing positive real functions, synthesis of R-L, R-C and L-C driving point functions-Foster and Cauer forms.	08

Text Books:

1. Franklin F. Kuc. "Network analysis and synthesis", PHL.
2. M.E.Vanvalkenberg.,"Network Analysis", PHL third edition.

3. Wiliam Hayt and jack kemmerly,"Engineering Circuit analysis', TMH.

Reference Books:

1. Circuits and Networks- Analysis and Synthesis: A.Sudhakar and S.P.Shyam Mohan.
2. D.Roy Choudhury: Networks and Systems, New Age International Pubs.

Term work:

The term work shall consist of at least four experiments and four assignments covering the whole of syllabus, duly recorded and graded will carry a weight age of fifteen marks. A test shall be conducted and will carry a weightage of ten marks.

SUGGESTED LIST OF EXPERIMENTS

1. Verification of superposition theorem using ac/dc source.
2. Verification of Thevenin's theorem using dependent /independent source.
3. Verification of maximum power transfer theorem using ac/dc source.
4. Verification of source transformation.
5. Charging and discharging of a capacitor
6. Measurement of parameters

S.E.(ELECTRONICS) SEMESTER-III
CONTROL SYSTEM ENGINEERING

Lectures: 4 Hours/Week — Theory Paper: 3hours and 100marks
Practicals: hours/week 02 — Term work & Oral Exam: 25 marks

	Detailed Syllabus	Lectures/ Week
1	**Introduction to control system analysis** Introduction, examples of control systems, open loop control systems, closed loop control systems. Transfer function. Types of feed back & feed back control system characteristics noise rejection, gain, sensitivity, stability.	06
2	**Mathematical Modeling systems** Importance of a mathematical model, Block diagrams, signal flow graphs, masan's gain formula and its application to block diagram reduction. State space method, solving time-invariant system, transfer matrix.	09
3	**Transient & steady state-Response Analysis** 3.1 Impulse response function, first order system, second order system time domain specifications of systems, analysis of transient-response using second order model. 3.2 Classifications of control systems according to "Type" of systems, steady-state errors, static error constants, steady-state errors, static error constants, steady-state errors, static error constants, steady state analysis of different types of systems using step, ramp and parabolic input signals.	12
4	**Stability Analysis** Introduction to concept of stability, stability analysis using Routh's stability criterion, Absolute stability, Relative stability. Root-Locus plots, summary of general rules for constructing Root-Locus, Root-Locus analysis of control systems. Compensation techniques - Log, lead, log-lead.	09
5	**Frequency-Response Analysis** Introduction, frequency domain specifications, response peak and peak resonating frequency, relationship between time and frequency domain specification of system. Bode plots, Polar plots, Log- magnitude Vs phase plots, Nyquist stability criterion, stability analysis, Relative stability, gain margin, phase margin, stability analysis of system using Bode plots. Closed-loop frequency response-constant gain and phase loci, Nichol's chart and their use in stability study of systems.	09
6	**Control components & Controller** AC servomotors, servo amplifier, potentiometer, synchro transmitters, synchro receivers. Synchro control transformer, stepper motors. Discontinuous controller modes, continuous controller modes, composite controllers.	09

Text books:

1. Nagrath, M.Gopal, control system Engineering, Tata McGraw Hill.
2. K.Ogata, Modern Control Engineering, Pearson education, third editon.
3.2.Benjamin C.Kuo, Automatic Control Systems, Pearson education, seventh edition.

Reference Books:

1. Madam Gopal, Control Systems principles and design, Tata McGraw hill, seventh edition, 1997.
2. Nise, control system engineering, John Wiley & sons, 3rd edition.
3. Curtis Johnson, process Control Instrumentation Technology, Pearson education fourth edition.

Termwork:

The Termwork shall consist of at least ten experiments and three assignments based on the whole syllabus, duly recorded and graded. This will carry a weightage of fifteen marks. A test shall be conducted and will carry a weightage of ten marks.

SUGGESTED LIST OF EXPERIMENTS

1. Transient response of 1st order & 2nd order system
2. Frequency response of 1st order & 2nd order system
3. Steady state error analysis of different types of systems
4. D.C. servomotor
5. A. C. servomotor
6. Synchro Transmitter and receiver
7. Potentiometer

Simulation

1. Block diagram education
2. Time response analysis
3. Frequency response analysis
4. Stability analysis

SE(ELECTRONICS) SEMESTER III

PRESENTATION AND COMMUNICATION TECHNIQUES

Lectures: 2 hours/week **Term work: 50 marks**

	Detailed Syllabus	Lectures/Week
1	**Communication in a business organization:** Inter and external communication, types of meetings, strategies for conducting successful business meeting, documentation (notice, agenda, minutes resolution) of meetings. Introduction to modern communication technique. (E-mail, internet video-conferencing, etc.) Legal and ethical issues in communication Intellectual property rights: parents, TRIPS, Geographical indications)	06
2	**Advanced technical writing:** Report writing: Definition and importance of reports, qualities of reports, language and style in reports, types of reports, formats (letter, memo, project-reports). Methods of compiling data for preparing report. A computer-aided presentation of a technical project report based on survey based or reference based topic. The topics are to be assigned to a assigned to a group of 8-10 students. The written report should not exceed 20 printed pages. Technical paper-writing writing business proposals.	08
3	**Interpersonal skills:** Introduction to emotional intelligence, motivation, Negotiation and conflict resolution, Assertiveness, team-building, decision-making, time-management persuasion.	03
4	**Presentation Skills:** Elements of an effective presentation, structure of a presentation, presentation tools, audience analysis, Language: Articulation, Good pronunciation, Voice quality, Modulation, Accent and Intonation	04
5	**Career Skills:** Preparing resumes and cover letters. Types of Resumes, interview techniques. Preparing for job interviews, facing an interview, verbal and non-verbal communication during interviews, observation sessions and role-play techniques to be used to demonstrate interview strategies (mock interviews).	04
6	**Group discussion:** Group discussions as part of selection process. Structure of a group discussion, Dynamics of group behaviour, techniques for effective participation, Team work and use of body language.	03

Term work:

Assignments:

2 assignments on communication topics

3 assignments on report-writing

3 assignments on interpersonal skills

2 assignments on career skills

At least one class test (written)

Distribution of term work marks will be as follows:

Assignments: 10 marks

Written test: 10 marks

Project report presentation: 20

Group discussion: 10 marks

Books recommended:

1. Fred Luthans: Organizational behavior, McGraw Hill
2. Lesikar and Petit, Report writing for business, tata mcgraw hill.
3. Huckin & Olsen, Technical writing and professional communication, McGraw Hill.
4. Wallace & Masters, Personal development for life & work, Thomson learning.
5. Heta Murphy, effective business communication, McGraw Hill.
6. Raman and Sharma, Report writing.

Additional Readings

1. Lewicki, Saunders & Minton: Essentials of negotiation, McGraw Hill.
2. Hartman lemacy, Presentation Success, Thomson Learning.
3. Kitty O.locking, Stephen Kyo Kaczmarek: Business Communication, Building Critical Skills, Mcgraw Hill.
4. Vikas Gupta:COMPDEX Computer course kit, IDG Books Pvt.Ltd.
5. Heller & Handle, the essential manager's manual, dorling Kindersley.
6. The Sunday times" Creating success series" 1. Develop your assertiveness. 2 Make every minute count 3.Sucessful Presentation skills 4.How to motivate people? 5. Team building. 6. Daniel Goleman, Emotional Intelligence.

SE (ELECTRONICS) SEMESTER IV

ADVANCED ENGINEERING MATHEMATICS

Lectures: 4 periods/week Theory paper: 3 hours and 100 marks

	Detailed Syllabus	Lectures/Week
1	**Random variables:** 1.1 Discrete and continuous random variable probability mass and density function for random variables. 1.2 Expected value, variance, moments and moment generating functions. 1.3 Relation between raw and central moments.	 02 03 02
2	**Probability distributions:** 2.1 Binomial Poison and Normal distribution. Introduction to distribution such as 't' and 'Y'X^2 central limit theorems and problems based on this theorems.	 06 04
3	**Sampling theory:** **3.1** Large and small samples, Test of significance for both samples. **3.2** Paired't' test. **3.3** Application for X^2 distribution.	 05 01 02
4	**Discrete Structure:** 4.1 Reaction and function (equivalence relation, injective, subjective and injective functions). 4.2 Poet, lattice (Bounded, complemented and distributive lattice). 4.3 Algebraic structure, Group, Ring, Field.	 04 04 04
5	**Matrices** **5.1** Corley Hamilton theorem, eigen values and eigen vectors(without proof) **5.2** Similar matrices, orthogonally similar matrices, reduction to the diagonal form.	 04 04
6	**Complex examples** 6.1 Cauchy's theorem and Cauchy's integral formula 6.2 Taylor's and Laurent's formula, Singularities and poles. 6.3 Residue theorem.	 03 04 03

Theory Examination:

1. Question paper will comprise of total 7 questions, each of 20 marks.
2. Only 5 questions need to be solved.
3. Question I will be compulsory and based on entire syllabus.
4. Remaining questions will be mixed in nature (for example Q2 a) from 2.1 then by will be from 4.1 or 5.1 other than 2.1.
5. In question paper weight age of each chapter will be proportional to number of respective lecture hours mentioned in the syllabus.

Recommended Books:

1.P.N.Wartikar/J.N.Wartikar, Text book Applied Mathematics, Pune Vidyarthi Griha Prakashan.
2. Theory of complex variable by shantinarayan.
3. Engineering mathematics by S.S.Sastri.
4. Fundamental of Mathematical Statistics By S.C.Gupta and V.K.Kapoor.
5. Discrete mathematics by Kolman, Busby, Sharon Rus.
6. Function of discrete mathematics by K.D.Joshi.

SE (ELECTRONICS) SEMESTER IV

ELECTRONIC CIRCUIT ANALYSIS & DESIGN

Lectures: 4 periods/week — Theory paper: 3 hours and 100 marks

Practicals: 2 periods/week — Termwork: 25 marks, oral :25 marks Practical:25 marks

	Detailed Syllabus	Lectures/Week
1	**Frequency Response of Amplifiers** High frequency parameters of BJT. Amplifier Frequency Response, System Transfer functions, S-Domain Analysis. First-coder functions, Bode Plots, Short-Circuit And Open-Circuit Time Constant High Frequency Response of BJT, FET and MOSFET amplifier analysis.	09
2	**OSCILLATORS** Analysis and Design of phase shift, Quadrature, Wien bridge, Hartley, Colpitt and Crystal Oscillator.	09
3	**Power Amplifiers** Power Amplifiers, Power Transistors - power BJTs, Power MOSFETs, Design the class-A, Class-AB Push Pull Pull Class-B Transformer Coupled Push Pull Amplifier, Complementary Class B Power Amplifier. Heat Sinks. Design heat sinks, for power Amplifier Devices.	09
4	**Differential Amplifiers** BJT, FET & MOSFET Differential Amplifier Analysis And Design, Design of CMOS, Differential Amplifier With Active Load (Ref: Donald Neamen).	09
5	**Multistage Amplifiers** Design Two Stage BJT. JEET and MOSFET Amplifiers And Design of CASCODE Amplifiers. Design of BJT-JFET hybrid amplifier.	12
6	**Feedback and stability** Introduction to Basic Feedback Concepts, Ideal Close-Loop Gain, Gain Sensitivity Bandwidth Extension, Noise Sensitivity, Reduction Of Nonlinear Distortion, Ideal Feedback Topologies. Analysis Of Series-Shunt, Series-Series, Shunt-Shunt, Shunt-Series Amplifiers, Loop Gain, Stability Of The Feedback Circuit. The Stability Problem, Bode Plots Of One-Pole, Two-Pole, And Three –Pole Amplifiers, Nyquist Stability Criterion, Phase And Gain Margins, Frequency Compensation Basic Theory. Closed Loop Frequency Response, Miller Compensation.	08

Books:

1. Microelectronics circuits (Analysis and Design) by Mohammad Rashid. Cengage learning.
2. Donald A. Neamen Electronic circuit analysis and design, second edition, Mcgraw Hill International edition 2001.
3. Martin Roden, Godon carpenter, William wise man, electronic design, fourth edition, shroff publishers 2002.

Reference Books:

1. Donald Schilling & Charies Belove, Electronic Circuits Discrete and Integrated, Third edition, Mcgraw Hill International edition, 1989.
2. Adelsedra & Kenneth Smith, Microelectronic Circuits, Fourth Edition, oxford university press, 1998.

Term work:

The term work shall consist of at least six laboratory experiments covering the whole of syllabus, duly recorded and graded as well as at least four computer simulations using EDA tools like PSPICE duly recorded and graded. This will carry a weightage of fifteen marks. A test shall be conducted and will carry a weightage of ten marks.

SUGGESTED LIST OF EXPERIMENTS

Laboratory / Simulations

1. To study frequency Response Of Cascade Amplifier.
2. To study RC phase shift oscillator and calculate threshold & practical frequency.
3. To study current series negative feedback amplifier and plot gain with feedback & without feedback.
4. To study Wein Bridge Oscillator.
5. To study class AB and B Pushpull Amplifier.
6. To study Hartley oscillator. Calcultate theoretical & practical frequency.
7. To study Colpitts Oscillator. Calculate theoretical & practical frequency.
8. To study frequency response of two stage RC coupled amplifier.

SE (ELECTRONICS) SEMESTER IV

Digital Systems Design II

Lectures : 4 hours/week **Theory Paper: 3 hours and 100 marks**
Practicals: 2 hours/week Practial:3hrs.50 marks Termwork work:25 marks Oral: 25 marks

1. Hardware Description Languages
Introduction to hardware description language, core features of VHDL, data types, concurrent and sequential statements, data flow, behavioral, structural architectures, subprograms, modularity, design reuse concepts.

2. Application of HDL in combinational circuits
Implementation of combinational circuits n VDL, use of component instantiation and structural architecture using VHDL and PLDs combinational circuit design examples- barrel shifter, simple floating – point encoder, cascading comparator.

3. Sequential logic design
Synchronous state machine design, designing state machines using state diagrams, state reduction techniques, state assignment rules, state machine synthesis using transition lists.

4. Applications of sequential circuits
MSI counters and applications, MSI

SE (ELECTRONICS) SEMESTER IV

Electronic and Electrical Measuring Instruments and Machines

Lectures : 4 hours/week
Practicals: 2 hours/week

Theory Paper: 3 hours and 100 marks
Termwork work:25 marks Oral: 25 marks

	Detailed Syllabus	Lectures/Week
1	**Electronic And Digital Voltmeters:** Principles of operation, advantages over conventional type analog voltmeters, basic voltmeter, peak reading, average reading, true RMS reading, sampling type, FET voltmeters, sensitivity considerations & calculations. Methods of analog-to-digital and digital-to-analog conversion, principles of operation and typical specifications of a digital voltmeter, description of various types of DVMs with block digital meter, digital displays for meters.	08
2	**Frequency meters, phase meters and signal generator:** Analog-schematic & operational details, limitations. Digital frequency meters, phase measurement by voltage addition method, balanced modulation type, phase meters using flip-flops, digital meters, advantages & limitations of each type. Requirement of a good laboratory type signal generator, A.F. signal generators, beat frequency oscillator & its advantages.	09
3	**Oscilloscopes:** Block diagram study of C.R.O., description of panel layout & implementation of controls. Requirement of time base, triggered time base delayed time base, external triggering etc. Lissajous patterns, use of these in phase & frequency measurements. Frequency time base, Wobbler scope & its applications, Dual trace, multi trace, Double beam, Sampling, Storage, Digital read out oscilloscopes. Use of CRO in square wave testing of amplifiers, tracing of diode & transistor characteristics.	09
4	**Basic measuring instruments:** Essentials of indicating instruments - deflecting, controlling and damping torque. Construction and working principles of moving iron and moving coil ammeters are voltmeters, electrodynamometer watt-meters, induction type energy meter power factor meters, instrument transformers.	12
5	**Measurement of R, L and C:** Measurement of low, medium, high resistances: Ohmmeter, Kelvin's double bridge, Whatstone's bridge, Megger. Measurement of inductance: Maxwell's Hay's and Anderson's bridge. Measurement of capacitance Schering bridge.	08
6	**6.1 DC Motors:** Back e.m.f. voltage equation, characteristics of series, shunt and compound motors, three point and four point starter and applications of dc motors. **6.2 Three phase induction motors:** Construction and principle of operation, slip, rotor frequency, torque equation, torque-speed characteristics, starting methods of induction motors. **6.3 Stepper motors:** Construction, working principle and applications of variable reluctance, permanent magnet and hybrid stepper motors.	04 03 03

Text books:

1. Cooper W. D. & Helfrick A.D., Electronics Instrumentation & Measurement Techniques, third edition Prentice Hall of India,1985.
2. Kalsi H.S., Electronic Instrumentation, first edition, Tata McGraw Hill, 1997.
3. Electrical and electronic measuring instruments: A.K.Sawhney.

Reference Books:

1. Electrical Measurements and measuring instruments: Golding and Widdis.
2. Electric Machines: Nagrath and Kothari.

Termwork:

The termwork should consist of at least eight experiments and three assignments covering the whole syllabus, duly recorded and graded. This will carry a weight age of fifteen marks. A test shall be conducted and will carry a weight age of ten marks.

SUGGESTED LIST OF EXPERIMENTS

1. Study of during integrating DVM.

2. a. Measurement of frequency using intensity modulation.
   b. Design and implementation of digital phase meter.
   c. Design and implementation of digital frequency meter.

3. a. Measurement of frequency using Lissajous patterns.
   b. Measurement of phase difference using XY mode of CRO.
   c. Application of CRO for component testing.

4. a. Calibrations of single phase energy meter.
   b. Conversion of galvanometer into ammeter/voltmeter.

5. a. Measurement of unknown resistance using Kelvin's double bridge.
   b. Measurement of unknown capacitance using Schering's bridge.
   c. Measurement of unknown inductance using Anderson's bridge.

6. a. Speed control of dc shunt using armature and field control.
   b. Starting of three phase induction motor using auto transformer starter.

SE (ELECTRONICS) SEMESTER IV

Lectures : 4 hours/week **Theory Paper: 3 hours and 100 marks**
Practicals: 2 hours/week **Termwork work:25 marks Oral: 25 marks**

BASIC OF ANALOG AND DIGITAL COMMUNICATION SYSTEM

	Detailed Syllabus	Lectures/Week
1	**Elements of Communication System:** Basic block diagram of communication system, modulation and demodulation concept, channels noise in communication system, signal-to-noise ratio, noise factor and noise figure, equivalent noise temperature electromagnetic waves propagation: Propagation terms and definitions.	06
2	**Amplitude modulation:** Principles of DSB full carrier AM, envelope detector, practical diode detector. Different types of AM: DSB-SC, SSB-SC, VSB, ISB.	12
3	**Angle modulation:** Principles of Frequency Modulation And Phase Modulation. FM Modulators, types of FM: NBFM and WBFM, FM Transmitter, noise triangle, pre-emphasis and de-emphasis circuits. FM detection: Frequency discriminator and phase discriminator.	12
4	**Radio Receivers:** Receiver Characteristics. TRF Receivers and Super heterodyne Receivers: choice of IF, AGC, AFC In AM and FM receivers.	07
5	**Analog Pulse Modulation:** Sampling Theorem for Low pass signals, Aliasing error, Sampling techniques, Principles, generation, Demodulation & Spectrum of PAM, PWM, PPM	07
6	**Digital Pulse Modulation:** Comparison of digital signal transmission over analog signal transmission, significance of regenerative repeaters Pulse-coded modulation (PCM): sampling, quantizing, encoding technique, PCM bandwidth, Necessity of companding, PCM Waveform formats: Uni-polar and polar NRZ, RZ, AMI Delta modulation (DM), Adaptive Delta Modulation (ADM), Multiplexing: TDM, FDM-Principles and applications.	12

Text Books:

1. Wayne Tomasi “Electronics communication system” Pearson education, Third edition, 2001.
2. Kennedy and Davis “Electronics communication system”, Tata Mcgraw Hill
3. R.P. Sing and S.D.Sapre, “Communication systems Analog and Digital”, Tata Mcgraw Hill
4. Taub and schilling “principles of communication systems”, Tata Mcgraw Hill

Reference Books:

1. Roy Black, “Electronics communication system”, Cenage learning, second edition.
2. B.P. Lathi “Modern Digital and analog Communication system” Third edition, OXFORD
3. Robert J.Schoenbeck “Electronics communications modulation and transmission”.
4. Lean W couch “Digital and Analog communication system”, Pearson education, Sixth edition

Term Work:

The term work shall consists of at least eight Laboratory experiments covering the whole of syllabus, duly recorded and graded. This will carry a weightage of fifteen marks. A test shall be conducted and will carry a weightage of ten marks.

SUGGESTED LIST OF EXPERIMENTS

1. Amplitude Modulation And Demodulation
2. DSB-SC & SSB-SC Modulation, demodulation
3. Frequency Modulation and Demodulation
4. Study of Superhetrodyne Receiver characteristics
5. Sampling and Reconstruction of sampled signals
6. Pulse Modulation (PAM, PWM, PPM)
7. Delta Modulation
8. Time Division Multiplexing of PCM signals
9. Line codes (NRZ, RZ, AMI-RZ)
10. Simulation on AM, FM/Multiplexing

SE (ELECTRONICS) SEMESTER IV

ELECTRONICS WORKSHOP - 1

Practicals: 2 hours/week **Termwork work:25 marks Oral: 25 marks**

Detailed Syllabus

This syllabus is designed to encourage students to design and implement innovative ideas. The syllabus will give them in depth practical knowledge from design to the final verification stage. Documentation of any project is an important part of the project and students are expected to document their work properly in standard IEEE format.

Every group of students should select different projects. Number of students should not be less than TWO and not more than THREE in one group.

1. **Study of Soldering Techniques and PCB Design**
   Students are expected to select any experiment* that they have already performed in earlier semester. Soldering and testing is to be done for the selected experiment. Perform simulation of the same experiment by using CAD tools. Schematic as well as PCB design is to be carried out using CAD tools.
2. **Design, Simulation and Implementation of Analog Project**
   Students are expected to design any* analog application of their choice. Perform simulation using software tools. PCB design, fabrication of PCB, testing and implementation should be done. Documentation of the project is to be done preferably in standard IEEE format using Latex/Win Tex. Project report should include abstract in maximum 100 words, keywords, introduction, design, simulation, implementation, results, conclusion and references.
3. **Digital Project**
   Students are expected to design any* digital application of their choice. Perform simulation using software tools for hardware description. Design should be synthesized using FPGA/CPLD. Documentation of the project is to be done preferably in standard IEEE format using Latex/Win Tex. Project report should include abstract in maximum 100 words, keywords, introduction, design, simulation, implementation, results, conclusion and references.

***To be approved by the subject Teacher**

References:

1. Roberts G.W. and Sedra A.S., “SPICE”, 2nd ed, USA
2. Rashid M.H. “SPICE for circuits and electronics using pSpiece”, Prentice Hall
3. Tuinenger P.W., “SPICE: A Guide to circuit simulation and analysis using pSpice”, Prentice Hall
4. Bosshart, “Printed Circuit Boards: Design and Technology”, Tata McGraw Hill
5. Orcad/PCBill, “User’s Guide”.
6. www.xilinx.com