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.	Applied Mathematics -III	4	-	1	100	25	-	-	125
2.	Basics 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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S. E. (ELECTRONICS) SEM-III
Subject :- Applied Mathematics- III

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

1.Laplace Transform: Lect.06
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. function, heavi side, dirac delta and periodic function and their l.t.
1.2 Inverse l.t. with partial fraction and convolution theorem
1.3Applications to solve initial and boundary value problems involving o.d.s.

2. Fourier series Lect.07
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.

3.1 Complex form of fourier series lect.02
3.2 Forier integral and fourier transform with properties in detail Lect.03

Matrieses Lect.06
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

Complex variables lect.10
5.1 Analytic function-Requation I Cartesian and polar form. Analytic function by milne-thompson method, harmonic function. 5.2 Conformal mapping, bilinear mapping and standard transforms.

Z-transform & vector analysis Letc.15
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)

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 marray 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.Adanced engg. Mathematics by c.ray wylie & lguis, c.barrott tata mcgrawq-hill publishing company limited
7.Advanced engg. Mathematics 8th 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**
Practicals: 2 hours / Week	**Termwork: 25 marks Oral :25 marks**
Term work : 25 marks	**Practical : 3 hours 50marks**

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.

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.

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 Connector 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.

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.

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).
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.

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, sroff 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 o 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**

Introduction to digital systems

Analog VS Digital system. Digital devices, Binary codes, gray codes, character codes, codes for detecting and correcting erros.

Logic circuits

Boolean Algebra , theorems, combinational circuit and analysis, combinational circuit Synthesis -minimization, Karnaugh Maps, sum of products , product of sum and their minimization, Programmed minimization methods – Quine McCluskey minimization algorithm, timing hazards – static and Dynamic hazards.

Combinational MSI, LSI devices:

Combinators, Design using SSI and MSI devices Decoders, 74x139,74x138), Encoders (74x148), Three state buffers(74x244,74x245),Multiplexers (74x151), Parity circuits (74180), Comparators(74180), Adders(7483), Subtracrters, ALUs(74181), Combinational multipliers, combinational PLDs.

Logic families

Basics of TTL CMOs, ECL circuits for basic logic operators just circuits and working of them in all above families. No characteristics of families.

Sequential logic principles

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.

Counters – Anythronous, synchronous counters, up down counters, mod counters, rim counters shift registers, universal shift register.

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.

Text books

1. RP Jain: Modern digital design, forth edition, tata mcgraw hill.
2. 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: hours/week Term work : 25 marks

Circuit analysis (ac and de): Lec.12

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.

Linear graphs: Lec.08

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.

Laplace transforms: Lec.08

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.

Transient and frequency analysis: Lec.10

Transient response of R-L, R-C, R-L-C circuits(series combinations only) for d.e. and nusoidal excitations-intial conditions-Solutions using differential equation approach and laplace transform methods of solutions, transfer function, concept of poles and zeros. Concept of frequency response of a system.

Two port networks: Lec.08

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 system

Fundamentals of network synthesis: Lec.08

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.

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 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

Introduction to control system analysis Lect.06

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.

Mathematical Modeling systems Lect.09

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.

Transient & steady state-Response Analysis Lect.12

Impulse response function, first order system, second order system time domain specifications of systems, analysis of transient-response using second order model.

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.

Stability Analysis Lect.09

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.

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, inquest 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.

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.

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 Instrmentation 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

1. Communication in a business organization: Lect.06
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)

2. Advanced technical writing: Lect.08
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.

3. Interpersonal skills: Lect.03
Introduction to emotional intelligence, motivation, negotiation and conflict resolution, assertiveness, team-building, decision-making, time-management persuasion.

4. Presentation Skills: Lect.04
Elements of an effective presentation, structure of a presentation, presentation tools, audience analysis, language articulation, good pronunciation.

5. Career Skills: Lect.04
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).

7. Group discussion: Lect.03
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.

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

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.