SCHEME OF INSTRUCTIONS AND EXAMINATION (R-2007)

UNIVERSITY OF MUMBAI

COURSE: ELECTRONICS AND TELECOMMUNICATION ENGG.

Second Year Engineering (Semester III & IV) (Revised-2007) Courses for Academic Year 2008-09, Electronics and Telecommunication Engineering Scheme for

Semester III

Sr. No.	Subjects	No. of Periods per week			Duration of Theory Paper(Hrs)	Marks				
		Lectures	Practical	Tutorials		Theory Paper	Term Work	Practical	Oral	Total
1	Applied Mathematics-III	4	-	-	3	100	-	-	-	100
2	Digital Logic Design	4	2	-	3	100	25	50	25	200
3	Electronic Devices & Circuits I	4	2	-	3	100	25	-	25	150
4	Electrical Networks	4	2	-	3	100	25	50	25	200
5	Electronic Instrumentation	4	2	-	3	100	25	-	25	150
6	Presentation and Communication Technique	2	2	-	3	-	50	-	-	50
Total		22	10	-	-	500	150	100	100	850

UNIVERSITY OF MUMBAI (Revised 2007)

Class: S.E. (Electronics & Telecommunication Engg.) **Semester-III**

Subject: -Applied Mathematics-III

Periods per week	**Lecture**	**4**	
	Practical	**-**	
01 Period of 60 min	**Tutorial**	**-**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**3**	**100**
	Practical	**-**	**-**
	Oral Examination	**-**	**-**
	Term Work	**-**	**-**
	Total	**-**	**100**

Lectures / Week
10 Hours

Laplace Transforms:

1. 1. Definition, linearity property, Laplace transporm of standard functions-1, Sinat, Cosat, Sinhat, Coshat..

2) First Shifting theorem, Second Shifting theorem, L {f(t)}, L{ }, Change of scale property, L { }, L { } (All theorems with proof).

Convolution theorem (without proof)

3) Laplace transform of Periodic functions, Error Function,

Heaviside Unit Step function and Dirac-delta function.

3. Laplace Transforms and **12 Hours**
2. Matrices

3.2.1 Inverse Laplace transforms, Solution of Ordinary differential

equations using the Laplace Transform method

3.2.2 Types of Matrices- Symmetric, Skew-symmetric, Hermitian,

Skew-Hermitian, Orthogonal and Unitary Matrices.

3.2.3 Inverse of a Matrix using Adjoint of a Matrix

. Matrices

1. Echelon form, Rank of a Matrix, Normal Form, PAQ in the Normal Form
2. System of Homogeneous and Non-homogeneous equations, their consistency and solution using rank of a Matrix.
3. Linear Dependence and independence of vectors.
4. Solution of a system of simultaneous linear equations using Gauss-elimination method, Gauss-Jordan reduction method, Gauss-Seidel iterative method.

3. Fourier Series **12 Hours**

4 1. Definition, Dirichelt's conditions (statement only) Fourier Series of function with period 2. Euler's formulae (with Proof)

3.4.2. Fourier series of functions having Arbitrary period 2L.

Fourier series of odd and even functions.

2. Half range Fourier series, Parseval's identity (without proof), Complex form of Fourier Series, Orthogonal & Orthonormal functions.

3. Fourier Transforms **08 Hours**

5 **1.** Idea of Fourier Integral representation, Fourier Sine and Cosine Integral representation.
Fourier Sine and Cosine Transforms. Linearity property, Change of Scale property, Shifting property.
2. Convolution theorem (statement only) and related problems

3. Z **08 Hours**

6. Transforms 1. Sequence, Representation of a sequence. Basic operations on sequence. Basic operations on sequences, Definition of Z transforms, Linearity property (without proof). Z transforms of standard sequences- Sink, Cosk, Coshk, Sink, Cosk
2. Change of scale property, Shifting property. Inverse Z transforms, Convolution theorem (statement only).
3. Inverse transform by Direct Division, Binomial expansion and Partial fraction method.

Theory Examination:

1. Question paper will be comprising of total 7 questions, each of 20 marks.
2. Only 5 questions need to be solved.
3. One question will be compulsory and based on entire syllabus.
4. Remaining questions will be mixed in nature. (e.g. suppose Q.2 has part (a) from, module 3 then part (b) will be from any module other than module 3)
5 In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Recommended Books:

1) A Text Book of Applied Mathematics Vol. I & II by P.N.Wartilar & J.N.Wartikar, Pune Vidyarthi Griha Prakashan.
2) Higher Engg. Mathematics by Dr. B.S. Grewal, Khanna Publication
3) Higher Engg. Mathematics by B V Ramana, Tata McGraw-Hill Publication.
4) Advanced Engg. Mathematics by Wylie & Barret, 6th Edition
5) Advanced Engg,. Mathematics by Erwin Kreysizg, John Wiley & Sons, Inc
6) Linear Algebra and Applications by Gilbert Strang, 4th Edition, Thompson Books / Cole.
7) Matrices By Shantinarayan, S. Chand Publications.

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Class: S.E. (Electronics & Telecommunication Engg.) **Semester-III**

Subject: -Digital Logic Design

Periods per week	**Lecture**	**4**		
	Practical	**2**		
01 Period of 60 min	**Tutorial**	**-**		
		Hours		**Marks**
Evaluation System	**Theory Examination**	**3**		**100**
	Practical	**3**	**50**	
	Oral Examination	**-**		**25**
	Term Work	**-**		**25**
	Total	**-**		**200**

Module	**Contents**	**Hours**
Objective	**Objectives of this course is to introduce to the students the basics of digital systems and its applications which are extensively used in computations which are extensively used in computation and data processing, control systems, communication and measurements.**	
Pre-requisite	**Concept of Diode, BJT and FET switching**	
1	Introduction to digital systems, comparison of digital and analog systems, number systems and conversion, binary arithmetic, codes, basic operations, Boolean laws, Universal gates, derived gates.	8
2	System definition, input – output relation, truth table formation, system equation in terms of minterms maxterms, SOP and POS forms. System equation reduction techniques- Boolean algebra, k-maps, quine-mcCluskey method. Implementation using basic and universal gates.	12
3	Combinational circuits – code conversion, adders, subtractors, multiplexers, de- multiplexers, encoders, decoders, PLDs, CPLDs, FPGAs. Design of combinational circuit as a solution to given problem.	12
4	Sequential circuits- latches, flip- flops, registers, counters.	12
5	General models of sequential circuit, derivation of state tables, state graphs, reduction of state tables, state assignment.	8
6	Introduction to Logic families and analysis of TTL, ECL and CMOS	8

Theory Examination :

1. Question paper will be comprising of total 7 questions, each of 20 marks.
2. All questions must be analytical oriented.
3. Only 5 questions need to be solved.
4. Question number 1 will be compulsory and covering the entire 6 modules.
5. Remaining questions will be mixed in nature. (e.g. suppose Q.2 has part (a) from, module 3 then part (b) will be from any module other than module 3.)
6. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.
7. No question should be asked from pre-requisite module.

Practical Examination:

Practical Examination will be based on any one experiment performed from the list of experiment given in the syllabus and the evaluation based on the same experiment.

Oral Examination: Oral Examination will be based on any experiment performed from the list of experiment given in the syllabus and the entire syllabus.

Term Work: Term Work shall consist of minimum eight experiment performed from the list of experiment given in the syllabus.

The distribution of marks for term work shall be as follows,

Laboratory work (Experiments and Journal) : 10 marks

Test (at least one) : 10 marks

Attendance (Practical and Theory) : 05 marks

The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term-work.

Practical List:

1. Implementation of X-OR and X-NOR using NAND and NOR
2. Design of adder, subtractor, BCD adder using IC 7483
3. Implementation of logic equations using MUX, DEMUX
4. Design of encoders and decoders
5. Conversion of flip flops
6. Design of counters and registers
7. Application of logic design – parity checker
8. Application of logic design- sequence detector

Recommended Books:

1. Digital Logic Comer, Oxford
2. Digital Logic Design Principles, Balbanian, Wiley
3. Digital Design, Vahid, Wiley
4. Fundamentals of logic design, Charles Roth, Cengage (Thomason)
5. Digital Fundamentals, Floyd / Jain Pearson
6. Fundamental of Switching theory and logic desing, Astola, Springer

UNIVERSITY OF MUMBAI (Revised 2007)

Class: S.E. (Electronics & Telecommunication Engg.) **Semester-III**

Subject: -Electronic Devices & Circuits-I

Periods per week	**Lecture**	**4**	
	Practical	**2**	
01 Period of 60 min	**Tutorial**	**-**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**3**	**100**
	Practical Examination	**-**	**--**
	Oral Examination	**-**	**25**
	Term Work	**-**	**25**
	Total	**-**	**150**

Module **Contents** **Hours**

Objective **To understand the analysis and synthesis / design of BJT and JFET and diode applications.**

To understand the concept of design.

Pre-requisite **DC/AC network theorems**

1 **Biasing of BJT:**
DC operating point, BJT characteristics & parameters, all biasing, with and without emitter resistor, analysis of above circuits and their design, variation of operation point and its stability. **10 Hours**.

2. **Small Signal BJT amplifiers:**
AC equivalent circuit, Rin, Av, Ai, Ro, hybrid, re model and their use in amplifier design. BJT as switch, BJT as a diode, emitter coupled pair, design considerations. **10 Hours**
Design of CE, BJT amplifier.

3. **Biasing of FET:**
Types of FET, characteristics and parameters of JFET, MOSFET, enhancement MOSFET, different biasing circuits, their analysis and design, location of operating point and its stability. CMOS devices.

4. **Small Signal FET amplifiers:** **10 Hours**
AC operation point, common source, common drain, common gate characteristics.
Design of CS, JFET amplifier.

5. **Power Circuits:** **10 Hours**
Design of rectifier circuit with Filters (L, LC, C, Multiple LC, L & pi section) and regulator using zener, BJT in series, BJT in shunt.

6. **Power switching and control devices:** **6 Hours**
Characteristics, ratings and applications of silicon controlled switch (SCS), Shockley diode, DIAC, TRIAC, UJT, Photo transistor, light activated SCR, optical couplers, IGBT, Power MOSFET.

Theory Examination :

1. Question paper will be comprising of total 7 questions, each of 20 marks.
2. All questions must be analytical oriented.
3. Only 5 questions need to be solved.
4. Two Questions will be compulsory and based on design of CE-BJT/CS-JFET amplifier/ Power circuits given in syllabus.
5. Remaining questions will be mixed in nature. (e.g. suppose Q.2 has part (a) from, module 3 then part (b) will be from any module other than module 3.)
6. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.
7. No question should be asked from **pre-requisite module.**

Oral Examination: Oral Examination will be based on any experiment performed from the list of experiment given in the syllabus and the entire syllabus.

Term Work:

Term Work shall consist of minimum eight experiments and a written test.

The distribution of marks for term work shall be as follows,

Laboratory work (Experiments and Journal): 10 marks

Test (at least one) : 10 marks

Attendance (Practical and Theory): 05 marks

The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term-work.

List of laboratory experiments:

1. Find out h-parameters of BJT,
2. Find out the Stability factor of BJT- Fixed biased circuit with Re and without Re.
3. Find out the Rin, Ro, Av, & Ai of CE BJT amplifier and verify with theoretical value.
4. Design and implement CE-BJT amplifier and verify various parameters.
5. Find out the parameters of JFET
6. Draw the output and transfer characteristics of D-MOSFET, E-MOSFET.
7. Find out the the Rin, Ro, Av, of CE JFET amplifier and verify with theoretical value.
8. Design and implement CS- JFET amplifier and verify various parameters.
9. Design and implement FWR with LC filter and verify various parameters.
10. Design and implement transistorized Regulator (Series type) and verify various parameters.
11. Design and implement transistorized Regulator (Shunt Type) and verify various parameters.
12. Draw the characteristics of TRAIC/UJT.

Recommended Books:

1. Foundations of Electronics: circuits & devices, Russell L Meade, Cengage (Thomson)
2. Microelectronic Circuits Analysis and Design, Rashid, PWS Publishing
3. Electronic Circuit Analysis and Design, Donald, A Neamen, TMH
4. Electronic Devices & Circuits Theory, Boylestad, Nashelesky, Pearson Education
5. Electronic Devices and Circuits by A. K. Maini, Wiley
6. Electronic devices – Floyd, Pearson Education Asia publication
7. Microelectronics – Jacob Millman & Arcin Grabel, Mc-Graw Hill Publication.

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Class: S.E. (Electronics & Telecommunication Engg.) **Semester-III**

Subject: -Electrical Networks

Periods per week	**Lecture**	**4**	
	Practical	**2**	
01 Period of 60 min	**Tutorial**	**-**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**3**	**100**
	Practical Examination	**3**	**50**
	Oral Examination	**-**	**25**
	Term Work	**-**	**25**
	Total	**-**	**200**

Module	**Contents**	**Hours**
Objective	**To understand basic principles and components of Electrical, Electronic circuit elements.**	

Pre-requisite **Fundamentals of DC and R-L-C AC networks**

1. Network Analysis: 8 **Hours**

DC Network analysis with independent and dependent sources. AC Network analysis. Coupled coils-mutual inductance.

2. Graph Theory: **5 Hours**

Fundamental definitions, The Incidence matrix, The Loop matrix and cut-set matrix, Loop, Node and Node- pair definitions.

3. Time response of first and second order systems: **15 Hours**

Initial conditions, Evaluation and Analysis of Transient and steady state responses using classical Technique and Laplace Transform.

4. Network Functions: **12 Hours**

Network functions for the one port and two port networks, Driving point and transfer functions, Poles and Zeros of Network functions and constraints on their locations, Time domain behavior as related to the Pole-Zero plot. Draw Bode plot for all types of networks functions.

5. Two-port parameters: 12 Hours

Open circuit , short circuit, transmission and hybrid parameters, relationship between parameter sets, reciprocity and symmetry conditions, interconnection of two-port networks, T and Pi representation, Terminated two-port networks.

6. Elements of reliability theory: 10 Hours

Causality and Stability, Hurwitz Polynomials, Positive real functions

7. Fundamentals of Network Synthesis (for driving point functions only): 10 Hours

Elementary Synthesis Procedures, Properties and synthesis of L-C, R-C and R-L impedance and admittance functions, synthesis of R-L-C functions.

Theory Examination :

1. Question paper will be comprising of total 7 questions, each of 20 marks.
2. All questions must be analytical oriented.
3. Only 5 questions need to be solved.
4. One Question will be compulsory and based on entire syllabus.
5. Remaining questions will be mixed in nature. (e.g. suppose Q.2 has part (a) from, module 3 then part (b) will be from any module other than module 3.)
6. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.
7. No question should be asked from **pre-requisite module.**

Practical Examination:

Practical Examination will be based on any one experiment performed from the list of experiment given in the syllabus and the evaluation based on the same experiment.

Oral Examination:

Oral Examination will be based on any experiment performed from the list of experiment given in the syllabus and the entire syllabus.

Term Work:

Term Work shall consist of minimum eight experiments and a written test.

The distribution of marks for term work shall be as follows,

Laboratory work (Experiments and Journal): 10 marks

Test (at least one) : 10 marks

Attendance (Practical and Theory): 05 marks

The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term-work.

List of laboratory experiments:

1. Make Current dependent Current source and verify.
2. Make Voltage dependent Current source and verify.
3. Verify Thevenin's and Norton's Thecrem using, at lease, one dependent source.
4. Find out time constant for series R-L circuit.
5. Find out time constant for series R-C circuit.
6. Make suitable two-port network and find its Z-parameters.
7. Make suitable two-port network and find its h-parameters.
8. Draw the Bode plot for given network and verify.
9. Synthesis the R-C network.
10. Synthesis the R-L network.

Recommended Books:

1.Network Analysis – M. E .Van Valkenburg , PHI publication

2. Network Analysis and Systems-Frenklin F. Kuo, John Wiley & sons publication.

3. Electrical Network theory- Balabancan and Bickart Robert E.Kreiger publishing company.

Class: S.E. (Electronics & Telecommunication Engg.) **Semester-III**

Subject: -Electronic Instrumentation

Periods per week	**Lecture**	**4**	
	Practical	**2**	
01 Period of 60 min	**Tutorial**	**-**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**3**	**100**
	Practical Examination	**--**	**--**
	Oral Examination	**-**	**25**
	Term Work	**-**	**25**
	Total		**150**

Module	**Contents**	**Hours**
Objective	**To understand basic principles and components of Electronic Measurements.** **To understand Principles of Advanced Electronic Instruments and its application.**	
Pre-requisite	**The course begins with linear DC and AC circuits and familiarizes the student with standard measurement tools. The relationship between time and frequency domain measurements of circuits is a fundamental component.**	
1.	**Sensors for Transducers:** Potentiometers, Differential Transformers, Resistance Strain Gauges, Capacitance Sensors, Eddy-Current Sensors, Pizoelectric, Photoelectric RTD, Thermisters, Thermocouple Sensors.	**12 Hours**
2.	**Oscilloscopes** Specifications of general purpose Oscilloscope, Controls, sweep modes, applications Digital storage oscilloscope and its feature like Roll, Refresh, and sampling rate, applications of DSO in Communication, recent trends in oscilloscope technology.	**12 Hours**
3.	**Signal Analyzers** Introduction to total harmonic distortion, wave analyzer and its applications, FFT analyzer and Network analyzer and their applications.	**8 Hours**
4.	**Measuring Instruments and Test Equipments** True RMS meter, Q meter, Standard AC and DC sources, Instruments for digital and analog circuit testing and automatic test equipment.	**8 Hours**
5.	**Converters and digital Instruments** A/D and D/A converters and their types. Specifications, data loggers, significance of 3 ½ and 4 ½ digit, Automation in digital instruments, DMM, Digital frequency meter, Universal counter and their applications like event, ratio, totalizing and timers etc.	**8Hours**
6.	Data Transmission Techniques Introduction to data transmission techniques, Pulse modulation, digital modulation techniques like Amplitude shift Keying, Phase shift Keying, telemetry and its applications in Instrumentation.	**8Hours**

Theory Examination:

1. Question paper will be comprising of total 7 questions, each of 20 marks.
2. Only 5 questions need to be solved including compulsory question no. 1 which must cover all the topics given in the syllabus of the said subject.
3. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.
4. No question should be asked from **pre-requisite module.**

Oral Examination:

Oral Examination will be based on any experiment performed from the list of experiment given in the syllabus and the entire syllabus.

Term Work:

Term Work shall consist of minimum eight experiments and a written test.

The distribution of marks for term work shall be as follows,

Laboratory work (Experiments and Journal): 10 marks

Test (at least one) : 10 marks

Attendance (Practical and Theory): 05 marks

The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term-work.

List of laboratory experiments:

1 . Measurement of True RMS value using True RMS meter.
2. To measure various physical phenomenon's viz. Temp. Pressure, Displacement etc. using different Transducers.
3. Q- Value measurement using LCR meter.
4. To measure Bandwidth using universal counter.
5. To measure X-amplifier bandwidth of CRO.
6. To measure time constant of relay using DSO
7. To build a function generator using IC.
8. To generate arbitrary waveform using arbitrary waveform generator.
9. To measure harmonics in different waveforms using FFT analyzer.
10. To study any one modulation technique.

Books Recommended:

1. Electronic Measurement and Instrumentation – H. Oliver and J.M.Cage, McGraw Hill, 2nd edition.

2. Instrumentation for Engineering Measurements, James Dally, William F. Riley and Kenneth G. McConnell, John Wiley and Sons. Inc., 2nd Edition 1993.

3. Digital Instrumentation, A.J. Bowens, McGraw-Hill, 1986.

4. Instrumentation Devices and Systems- C.S.Rangan, G.R. Sarma, V.S.V. Mani Tata McGraw Hill, 9th edition.

5.Elements of Electronic Instrumentation and Control , J.J.Carr, Prentice Hall, 3rd Edition.

6. Electronic Instrumentation and Measurement Techniques, W. Cooper, A. Helfric, PHI, 3rd edition.

7. Electronic Instrumentation, J.A. Alloca Prentics Hall, 2nd edition.

8. Handbook of Electronic Instrumentation, Coombs.

Class: S.E. (Electronics & Telecommunication Engg.) **Semester-III**

Subject: -Presentation and Communication Techniques

Periods per week	**Lecture**	**2**	
	Practical	**2**	
01 Period of 60 min	**Tutorial**	**-**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**--**	**--**
	Practical Examination	**--**	**--**
	Oral Examination	**-**	**--**
	Term Work	**-**	**--**
	Total		**50**

1. **Communication in a Business Organization:** **06**
   Internal & External Communication, Types of meetings, strategies for conducting successful business meetings, documentation (notice, agenda minutes, resolution) of meetings. Introduction to modern communication techniques (for e.g. e-mail, internet, video conferencing etc), Legal & ethical issues in communication (intellectual property rights, patents TRIPS, Geographical indications)
2. **Advanced Technical Writing:** **08**
   a. **Report – Writing :** Definition and importance of reports. Qualities of Reports, language and style in reports, type of reports, formats (letter, memo, project-reports), methods of compiling data for preparing report.
   b. **Technical Paper Writing, Writing business Proposals.**
3. **Interpersonal Skills:**
   Introduction to emotional intelligence, Motivation, Negotiation and conflict-resolution Assertiveness, Team-building, Decision-making, Time-management, persuasion.
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.
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)

6. Group discussion:
Group discussions as part of selection process, Structure of a group discussion, Dynamics of Group Behavior, Techniques for effective participation, Team work and use of body language.

Term Work: Part-I (25 Marks): 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)

Assignment : 10 marks

Written Test : 10 marks

Attendance (Theory and Practical) : 05 marks
Term Work : Part-II (25 Marks): Presentation;

Distribution of term work marks will be as follows:
Project report presentation: 15 marks
Group discussion : 10 marks

The final certification and acceptance of term-work ensures the satisfactory performance of laboratory work and minimum passing in the term-work.

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 Lerning.
5. Heta Murphy, Effective Business Communication, McGraw Hill
6. Raman and Sharma, Report Writing.