

University of Mumbai
Revised Scheme & Syllabus
For T.E. Electronics & Telecommunication Engg

SEMESTER-V

Sr.No.	Subjects	No. of Periods per week			Duration of Theory Paper(Hrs)	Marks				
		Lectures	Practicals	Tutorials		Theory Paper	Term Work	Practical	Oral	Total
1	*Applied Math's-V	4	-	-	3	100	-	-	-	100
2	*Presentation and Communication Techniques	2	2	-	-	100	25	-	-	50
3	Computer Architecture and Organization	3	-	1	3	100	25	-	-	125
4	Communication circuits	3	3	-	3	100	25	-	-	125
5	Filter Theory	3	2	-	3	100	25	-	-	125
6	** Elements of Microprocessors	3	3	-	3	100	25	-	-	125
7	Elements of Microelectronics	3	-	-	3	100	25	-	-	125
Total		21	10	1	-	600	150	-	-	725

- Subject common with Electrical, Electronics, Instrumentation and Biomedical Engineering branches.
- Subject common with Instrumentation Engineering branch.

**T.E.(ELECTRICAL/ELECTRONICS/INSTRUMENTATION/BIOMEDICAL/
ELECTRONICS&TELECOMMUNICATION)**

SEMESTER V

APPLIED MATHEMATICS-V

Lecture: 4hrs per week.

100 Marks(3hrs)

1. Random Variables:

Discrete and continuous Random Variables. Probability mass function and density function probability distribution for random variables. Expected value, Variance, Moments and Moments generating functions Relation between Raw moments and central moments.

2. Probability Distributions:

Binomial, Poisson and Normal Distribution for Detailed Study. Introduction to the distributions such as 't' and chi-square. Central limit theorem and problems based on this theorem.

3. Sampling Theory:

Sampling distribution. Test of Hypothesis Level of significance critical region. One Tailed and Two tailed tests. Internal estimation of population parameters.

Large and small samples:

Test of significance for large samples

- I. Test for significance of the difference between sample mean and population means.
- II. Test for significance of the difference between the means of two samples.

Test of significance for small sample

- I. Test for significance of the difference between sample mean and population means.
- II Test for significance of the difference between the means of two Samples.

Application of X^2 distribution.

Test of the goodness of fit and independence of Attributes.

4. Fitting of curves:

Least square method, Fitting of the straight line and parabolic Trend Biva Frequency distribution Covariance and correlation Karl Pearsons coefficient spearman's Rank correlation co-efficient (non repeated and repeated ranks) line regression.

5. Introduction to discrete Structure:

- A. Relations and functions Matrix of relation Partial order and equivalence relation Injective, Surjective and Bijective functions Pigeonhole principle and its application.
- B. Posets and Hasse Diagram. Lattice, Bounded lattice, Complemented lattice and distributive lattice.
- C. Algebraic Structure: Groups, Rings, Integral domains, Fields, Boolean Algebra, Homomorphism and isomorphism's of Algebraic structures.

BOOKS:

- 1) “Fundamentals of Mathematical Statistics”
S.C.Gupta & V.K. Kapoor Sultan Chand & Co. N.Delhi
- 2) “Probability Statistics and Random Processes”
T.V. Veerajan, Tata McGraw Hill Publications
- 3) “Probability & Statics” Schaum Series
- 4) Discrete Mathematics- Second Edition
N.Biggs – Oxford University Press
- 5) Schaums Outlines – Discrete Mathematics- Tata McGraw Hill Publications
- 6) Discrete Mathematical Structures – Bernard Kolman, C. Bushy, Sharon Rus, Prentice
Hall of India Pvt. Ltd.
- 7) Function of Discrete Mathematics-K.D.Joshi.

UNIVERSITY OF MUMBAI
THIRD YEAR ENGINEERING SYLLABUS
SEMESTER – V

PRESENTATION AND COMMUNICATION TECHNIQUES

LECTURES : 2 PERIODS / WEEK
TUTORIALS: 2 PERIODS/WEEK

ORAL:25
TERM WORK MARKS:25

- 1. Communication in a Business Organization:**
Internal (Upward, Downward, Horizontal, Grapevine, Problems, Solutions) External Communication, Strategies for conducting successful business meetings, documentation (notice, agenda minutes) 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)
- 2. Advanced Technical Writing:**
 - a. Report – Writing and presentation:** 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. A computer-aids
 - b. Technical Paper Writing**
 - c. Writing Proposals**
- 3. Interpersonal Skills:**
Introduction to emotional intelligence, Motivation, Negotiation and conflict-resolution Assertiveness, Leadership, Team-building, Decision-making, Time-management
- 4. Interview Techniques:**
Preparing for job interviews, verbal and non-verbal communication during interview. Observation sessions and role-play techniques may be used to demonstrate interview strategies.
- 5. Group Discussion:**
Dynamics of Group Behavior, Techniques for effective participation.

Assignments:

Written
2 assignments on Communication topics
3 assignments on Report writing
3 assignments on Interpersonal Skills
1 class test.

Oral:

Practical sessions on Group-discussion / Interview Skills / Project Presentation / Power point Presentation.

Break up of Term Work Marks (External Exam)

Assignments	20 marks
Test	5 marks
Total	25 marks

Break up of Oral Examination(Internal Exam)

Project Report Presentation	20 marks
Group Discussion	5 marks
Total	25 marks

Books Recommended:**A. For classroom teaching**

- (i) Fred Luthans, 'Organizational Behavior' McGraw Hill International Edition
- (ii) Lesiker and Petit 'Report writing For Business' McGraw Hill International Edition
- (iii) Huckin and Olsen 'Technical Writing and Professional Communication' – McGraw Hill International Edition
- (iv) Wallace and Masters 'Personal Development for life and Work' (workbook) Thomson Learning
- (v) Herta Murphy 'Effective Business Communication' Herta Murphy Herbrutwildebraudt- McGraw Hill

B. For Additional Reading:

- (i) Lewicki, Saunders, Minton 'Essential of Negotiation' McGraw Hill International Edition
- (ii) Hartman Lemay 'Presentation Success' Thomson learning.
- (iii) Kitty O Locker & Kaczmark – Business Communication Building Critical Skills McGraw Hill
- (iv) Vikas Gupta: Comdex Computer Course Kit, IDG Books Pvt, Ltd.
- (v) Heller & Handle: The Essential Manager's Manual – Dorleen Kindercey
- (vi) The Sunday Times 'Creating Success Series'
 - 1. Develop your Assertiveness
 - 2. Make every Minute Count
 - 3. Successful Presentation Skills
 - 4. How to motivate people
 - 5. Team building.

UNIVERSITY OF MUMBAI
T.E.(Electronics & Telecommunication Engg.)
Semester-V
Subject: Computer Architecture and Organization

Lectures:3p/week
Tutorial:1p/week

Paper:100marks,3Hrs
Term Work:25 marks

1. Introduction:

History and evolution of computers, architecture of a general purpose computer, stored program computer operation.

2. Datapath Design:

Computer system design, gate level design, register level design and processor level design, fixed point arithmetic, data paths of Two's complement addition subtraction, multiplication and division, Booths algorithm for multiplication, floating point ALU.

3. Processor Design:

CPU organization and operation, accumulator based CPU, CPU with general registers, instruction types, formats and addressing arithmetic – logic unit design, sequential ALUs, structure of a basic sequential files, co-processors and pipeline processors, RISC and CISC computers.

4. Control Design:

General structure of hardwired and micro-programmed control units, hardwired control design, state tables, greatest common divisor processor, classical design of the ged processor control unit, design of a typical of CPU control unit, micro-programmed control, control unit organization, microinstruction addressing and timing, micro-program sequencers, pipeline control, instruction pipeline, structure multistage pipeline, organization of CPU with multistage instruction pipeline, pipeline performance, measures.

5. Memory Organization:

Organization of multilevel memory system in a computer, main memory: Random access memory organization, semiconductor RAMs, RAM,s design structure of a D-RAM chip,secondary memory: several access memory, access methods, memory organization magnetic disc and tape reluctant array of inexpensive disks, memories, optical memory, and read out devices.

6. High speed Cache Memory System:

Cache and virtual memory, address translation with segmentation and paging with caches, cache organization, operation address mapping associative memory, cache types and performance.

7. System Buses and I/O, Communication:

Buses, bus interfacing timing bus arbitration, I/O and system control, I/O control methods, Programmed I/O, I/O processors: I/O instruction types, measures, I/OP organization, CPU and IOP interaction.'

8. Multiple Advanced Processor Organizations:

Parallel processing shared and distributed memory computers, processor interconnection network structures and performance, multiprocessors (MIMD).

Term Work :

Each student has to appear for at least one written test during the term. At least eight assignments along with a graded answer paper shall be submitted as term work

The distribution of term work will be as follows:

Assignments –15 marks.

Written Test- 10 marks.

Text Book:

- 1.Computer Architecture and Organization- John P.Hayes
Mc-Graw Hill international publication.

Reference Book:

- 1.Computer Organization and Architectre- William Stalling
Prentice Hall of India publication.
2. Computer Organization – V.Carl Hamacer and Zalky
Tata Mc-GrawHill punblication

UNIVERSITY OF MUMBAI

T.E.(Electronics & Telecommunication Engg.)

Semester-V

Subject: Communication Circuits

Lectures:3p/week

Practical:3p/week

Paper:100marks,3Hrs

Term Work:25 marks

1 Noise an inter-modulation distortion:

Noise sources, noise measures, design of low noise networks, inter-modulation distortions.

2 Frequency selective networks and transformers:

Series resonant circuits, parallel resonant circuits with transformers, impedance matching and harmonic filtering using reactive networks.

3 Hybrid and transformers line transformers:

Three-winding transformers, transmission line transformers.

4 Audio Circuits:

General features of audio amplifiers, LM380 audio power amplifier, phono-amplifier, circuits for tone control, audio mixers, graphic equalizers.

5 Wideband amplifiers:

Review of high frequency analysis of BJT and FET amplifiers, input compensation, neutralization and feedback techniques for wide banding cascade amplifiers, high frequency amplifiers using MOSFETS, study of IC s- I) Video amplifier IC RCA 3040, II) wideband Op-amp HA – 2539.

6 Phase Locked Loop Circuits:

Basic PLL operation, transient response of PLL, Linear model of the PLL- 1st order, 2nd order PLL, lock range and capture range, phase detectors, PLL application- tracking filters, angle modulation, frequency demodulation, amplitude demodulation, phase shifters, signal synchronizers, frequency translators PLL IC 565, digital PLL.

7 Frequency Synthesizers:

Direct frequency synthesis, frequency synthesis by phase lock, 565 as frequency synthesizer, effect of reference frequency on loop performance variable modulus dividers, down conversion, methods for reducing switching time, multiple loop frequency synthesizer, fractional N loops, direct digital synthesis, synthesizer design.

8 Mixers, modulators and demodulator circuits:

Frequency mixers, switching type mixers, diode ring mixers, square law mixers, BJT and FET mixers, review of balanced modulator principle, applications of balanced modulator, modulator/demodulator IC MC 1596, MC 1596 as balanced modulators, amplitude modulators, product detector, mixer, frequency doubler, AM generation and synchronous AM detection using XR-2208.

List of Experiments:

1. Cascade amplifier
2. PLL applications
3. Frequency Synthesizer using IC 565
4. Balanced Modulators
5. Impedance matching networks
6. Transformer coupled transistor amplifier
7. Video amplifier (using IC)
8. Wide band operational amplifier
9. Mixer circuits
10. Audio amplifier (using IC)

Term Work:

Each student has to appear for at least one written test during the term. Report On eight experiments (including two using software simulation) from the list of suggested experiments and assignments along with a graded answer paper shall be submitted as term work.

The distribution of term work will be as follows:

Report on experiments – 15 marks.

Written Test – 10 marks

Text Books:

1. Modern Communication Circuits-Jack Smith
Mc-Graw Hill publication
2. Integrated circuits- K.R.Botkar
Khanna publication.

UNIVERSITY OF MUMBAI
T.E.(Electronics & Telecommunication Engg.)
Semester-V
Subject: Filter Theory

Lectures:3p/week
Practical:2p/week

Paper:100marks,3Hrs
Term Work:25 marks

- 1. Network Analysis:**
RLC passive circuits, RLC circuits with active elements, simplified analysis of operational amplifier circuits.
- 2. Network functions and their realizability:**
Network functions, properties of all network functions, driving point functions properties transfer functions, magnitude and phase plots, Biquadratic functions. Frequency and impedance denormalization.
- 3. Introductory filter concepts:**
Categorization of filters (LP, HP, BP, BR) gain and delay equalizers passive, active and other filters.
- 4. Approximation:**
Bode plot, Butterworth, Chebyshev elliptical, Bessel, frequency transformation.
- 5. Sensitivity:**
W and R sensitivity, gain sensitivity, factors affecting sensitivity.
- 6. Passive Network Synthesis:**
Driving point synthesis, low sensitivity passive network, transfer function, synthesis.
- 7. Active Filters:**
Single amplifier active RC filters Lowpass, high pass and band pass active filter realization, infinite gain single amplifier filters (LP, BP & HP), positive and negative feedback infinite gain single amplifier filters, higher order filters.
- 8. Multiple amplifier RC filters:**
State variable filter, Tow Thomas, Akerberg Mossberg, Biquadratic multiple amplifier, universal active filters.
- 9. Direct Realization Methods:**
Active network elements for direct realization, inductance simulation frequency dependent negative resistors, leapfrog realization techniques, primary resonator block, switched capacitor filters.
- 10. Effect of real operational amplifier on active filters:**
OP-Amp frequency compensation techniques, frequency characteristics on filter performance

List of Experiments:

- 1 Plot frequency response of RC/RLC circuits and find the type of filter.
- 2 Effect of frequency and impedance denormalization on passive Circuits.
- 3 Frequency response of Chebyshev filters show minima, maxima locations, cut off frequencies.
- 4 Synthesize butter worth filters (LP /HP)
- 5 Frequency transformation low pass to high pass, low pass to band filters
- 6 Finite gain LP/single amplifier
- 7 Infinite gain LP/ single amplifier
- 8 Finite gain HP single amplifier filter
- 9 Multiple amplifier filter.

Term Work :

Each student has to appear for at least one written test during the term. Report on eight experiments (including two using software simulation) from the list of suggested experiments and assignments along with a graded answer paper shall be submitted as term work.

The distribution of term work will be as follows:

Report on experiments – 15 marks.

Written Test – 10 marks

Text Books:

- 1.Principles of Active Network synthesis and design.
Gotind Dariyannai, Jonh Wiley publication.
- 2.Active and passive analog filter design – Lawrence
P.Huwan
Tata Mc-Graw Hill publication.

Reference Books:

1. Active and passive filters – Chen
John Wiley publication.

UNIVERSITY OF MUMBAI
T.E.(Electronics & Telecommunication Engg.)
Semester-V
Subject: Elements of Microprocessors

Lectures:3p/week

Practical:2p/week

Paper:100marks,3Hrs

Term Work:25 marks

1. 8085 Microprocessor:

Basic 8085 Microprocessor architecture and its functional blocks, 8085 Microprocessor IC pin-outs and signals, address, data and control buses, clock signals, instruction cycles, machine cycles, and timing states, instruction timing diagram.

2. Programming of 8085 Microprocessor:

Basic instruction set of 8085, addressing modes, writing assembly language programs, looping, counting and indexing operations, stacks and subroutines, conditional call and return instructions, debugging programs.

3. 8085 Interfacing and Interrupts: Bus interfacing concepts, timing for the execution of input and output (I/O) instructions, I/O address decoding, memory and I/O interfacing memory mapped I/O interfacing of matrix input keyboard and output display. Serial I/O lines of 8085 and the implementation asynchronous serial data communication using SID and SOD lines, interrupt structure of 8085, RST (restart) instructions, vectored interrupt, interrupt process and timing diagram of interrupt instruction execution, 8259A interrupt controller, principles block I/O data transfer (direct memory access) techniques.

4. Programmable Interface and Peripheral Devices: Programming and applications of 8455 /8156 programmable I/O ports and timer, 8255A programmable peripheral interface, 8253 / 8254 programmable interval timer, 8257 direct memory access controller, 8279 programmable keyboard/ display interface.

5. 8086 and 8088 Microprocessors: Architecture and organization of 8086 / 8088 microprocessor family, bus interface unit, 8086 / 8088 hardware pin signals, timing diagram of 8086 family microprocessors, simplifier read / write bus cycles, 89086 minimum and maximum modes of operation. 8086 / 8088 memory addressing, address decoding, memory system design of 8086 family, timing considerations for memory interfacing, input / output port addressing and decoding, introduction to 8087 floating point coprocessor and its connection to host 8086.

6. 8086 Assembly Language Programming: Addressing modes, 8086 instruction formats and instruction set, data transfer, arithmetic, arithmetic, bit manipulation, string, program execution transfer and processor control instructions, machine codes for 8886 instructions, assembly language syntax, assembler directives, initialization instructions, simple sequential and looping programs in assembly language, debugging assembly language, debugging assembly language programs.

7. **Advanced assembly level programming:** Conditional jumps and IF-THEN-ELSE, WHILE-DO REPEAT-UNTIL, delay loop programs, implementing procedure calls, Passing parameters using pointers and stack, reentrant and recursive procedures, Calling FAR procedures, assembler MACRO instructions, software interrupts and Interrupt service routines, software interrupt applications, such as basic input output System of IBM-PC computer, high level C-language calls to assembly programs with An illustrative example.

Term Work :

Each student has to appear for at least one written test during the term. Report on experiments (at least eight) and assignments along with a graded answer paper shall be submitted as term work.

The distribution of term work will be as follows:

Assignments –15 marks.

Written Test- 10 marks.

Text Books:

1. Microprocessor, Architecture, Programming and Applications with 8085- Gaonkar John Wiley Eastern, Ltd. Publication
2. Microprocessors and Interfacing – Douglas V.Hall
Tata Mc-Graw Hill publication.

Reference Books:

1. Microcomputer Systems: The 8086 /8088 Family – Yu-cheng Liu, Glen A. Gibson Prentice Hall of India publication.
2. The 8086 Microprocessors and Interfacing the PC – Kenneth J. Ayala Penram publication.
3. The 8086 Family – John Uffenbeck Prentice Hall of India publication.

UNIVERSITY OF MUMBAI
T.E.(Electronics & Telecommunication Engg.)
Semester-V

Subject: Elements of Microelectronics

Lectures:3p/week

Practical:1p/week

Paper:100marks,3Hrs

Term Work:25 marks

1.Basics of Devices:

Basic of BJT, MOSFETs and their technological structures as implemented in silicon crystal. Various types of integrated circuit resistors such as diffused resistor, pinched resistor, thin film resistors etc. and their implementation (structure) in silicon crystal. Different types of integrated circuit capacitors, their structure as implemented in silicon crystal. Parasitic effects in MOSFETs, BJTs and their minimization by scaling of device dimensions. Definitions of LSI, MSI, VLSI circuits. Merits and demerits of MOS integrated circuits.

2.Basic Circuits(Gates):

Simple bipolar NAND gate operation and its realization or implementation in silicon structure (using p-n junction isolation technique). A depletion load n MOS inverter and NAND gate operation, their technological structures as implemented in silicon crystal. Drawing stick diagrams, color coded mask layout using I-based (or micron-based) design rules. The CMOS inverter (NOT gate) structure, its stick diagram and mask layout. Parasitic effects in CMOS structure (inverter).

3.IC Fabrication:

Various important step of MOS Bipolar IC fabrication such as water cleaning, oxidation, annealing, patternization using photolithography technique. Diffusion, Metalization, ion-implantation etc. Fabrication of simple circuits using above fabrication steps. (only qualitative treatment).

Term Work:

Term work shall consist of at least three laboratory experiments covering the whole of syllabus, duly recorded and graded as well as at least four computer simulation (Mask layout Design) using EDA Tools or Magic Software.

Reference Books:

- 1.Principle of CMOS VLSI Design- Neil H.E. Weste, Kamran Eshraghian, Addison Wesley
- 2.VLSI Technology – S.M.Sze
- 3.Microelectronics – J. Millman and Grabal
Tata McGraw Hill publishing Co.Ltd.
4. Basics VLSI Design, System and Circuits- Douglas A.Pucknel,
Shanghais.
5. Fabrication Principles – S.K.Gandhi