## SCHOOL OF EEE
Department of Electronics & Communication Engineering
Scheme of Studies

**B.Tech Degree Programme (Regular)**

### 2nd Year

#### SEMESTER – III

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<th>SN</th>
<th>Course No.</th>
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#### SEMESTER – IV

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Objective: To enhance the language proficiency, communication process and the importance of English language in the present scenario; to develop good body language; to learn the correct sentence structure and to develop the career skills.

UNIT 1: Communication process:- Language for communication; Language skills; Status of English language; Types of communication; Means of communication; process of communication; Barriers in communication; Principles of effective communication; Pronunciation with proper accent, stress, tone & intonation

UNIT 2: Comprehension: Listening & Reading Comprehension; Framing questions from passages; Framing sentences using words, phrases etc. Types of sentences
UNIT 3: Grammar:- Question tag; Conditional sentences; Use of Gerund & infinitive; Degrees of comparison; Articles; Punctuation & capitalization; Subject-verb agreement; Sentence correction

UNIT 4: Presentation Skills:- Types of presentation; Strategies of effective presentation; Merits & demerits of interactive presentation & power point presentation; Presentation on the given topic

UNIT 5: Group communication:- Non verbal Communication; Body language in GD; Leading & directing discussion; Effective interventions; Expressing opinions & disagreements; GD in the selection process;; GD on corporate issues; Conference, seminar & symposium

UNIT 6: Interview:- An introduction; Types of interview with purpose; Preparation for job interview; Types of job interview; Strategies for successful interview; Press conference

UNIT 7: Career Skills:- Job interview; Resume writing & Job Application; Group dynamics; Decision making; Leadership qualities

Prescribed Text book

1. Technical Communication Principles & Practice (2nd Ed.) by Meenakshi Raman & Sangeeta Sharma published by Oxford University

2. The Functional Aspects of Communication Skills by Dr. Prajapati Prasad published by S.K. Kataria & Sons


SUGGESTED READING:
1. Language in Use (Upper intermediate Level, Adrian Doff Christopher Jones, Cambridge University Press
5. The sounds of English, Veena Kumar, Makaav Educational Software, New Delhi.

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<th>MA-202</th>
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1. **ERRORS IN NUMERICAL CALCULATIONS:**
   Introduction; numbers and their accuracy; absolute; relative and percentage errors and their analysis; truncation errors; general formula; error calculation for inverse problem.

2. **SOLUTION OF NON-LINEAR EQUATIONS:**
   Bisection method; Regula-Falsi method; Secant method; Newton-Raphson method; fixed point method; initial approximation and convergence criteria.

3. **SOLUTION OF LINEAR SYSTEMS:** Gauss elimination method; Gauss-Jorden method; UV factorization, Jacobi’s method; Gauss-Seidal method.

4. **INTERPOLATION & CURVE FITTING:**
   Introduction to interpolation; Newton’s forward and backward formula; Sterling formula; Lagrangian polynomials; divided differences; least squares method.

5. **NUMERICAL DIFFERENTIATION AND INTEGRATION:** Derivatives from differences tables; numerical differentiation formulas, Newton-Cotes integration formulae; trapezoidal rule; Simpson’s rule; Bool’s rule; Weddle’s rule; Romberg’s rule.

6. **SOLUTION OF DIFFERENTIAL EQUATIONS:**
   Taylor’s series method; Euler and modified Euler’s method; Runge-Kutta method; Milne’s prediction corrector method, Adams–Bashforth method.

7. **SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS:** Finite difference approximation; solution of Laplace equation (standard 5 point formula) one-dimensional heat
equation (Schmidt method, Cranck-Nicolson method; Dufort & Frankel method and wave equation.

TEXT BOOK
Grewal B. S., “Numerical Methods in Engineering and Sciences”, Khanna Publisher

REFERENCE BOOKS

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<th>Analog Electronics</th>
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1. SEMICONDUCTOR DIODE: Diode as a rectifier; switching characteristics of diode; Diode as a circuit element; the load-line concept.

2. SEMICONDUCTOR DIODE CIRCUITS: Halfwave and full wave rectifiers; clipping circuits; clamping circuits; filter circuits; peak to peak detector; voltage doublers and voltage multiplier circuits.

3. TRANSISTOR AT LOW FREQUENCIES: Bipolar junction transistor : π characteristics; Ebers-moll model of transistor; hybrid model; h-parameters (CE; CB; CC configurations); analysis of a transistor amplifier circuits using h-parameters; emitter follower; Miller's Theorem; Effect of Emitter by pass capacitor on low frequency response; Step response of an amplifier; frequency response of R-C coupled amplifier; pass band of cascaded stages; Multi stage CE Amplifier.

4. TRANSISTOR BIASING: Operating point; bias stability; collector to base bias; self-bias; emitter bias; bias compensation; thermistor and sensistor compensation; thermal runaway.
5. **TRANSISTOR AT HIGH FREQUENCIES**: Hybrid model; CE short circuit current gain; frequency response; alpha; cutoff frequency; gain bandwidth product; emitter follower at high frequencies.

6. **FIELD EFFECT TRANSISTORS**: Junction field effect transistor; MOSFET Enhancement and Depletion mode; V-MOSFET; Common source amplifier; source follower; biasing of FET; applications of FET as a voltage variable resistor (V V R).

7. **REGULATED POWER SUPPLIES**: Series and shunt voltage regulators; power supply parameters; three terminal IC regulators; SMPS.

**TEXT BOOK**

**REFERENCE BOOKS**

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**1 CONDUCTING MATERIALS**: Drift velocity, collision time; Mean free path; mobility; conductivity; relaxation time; factors affecting conductivity of materials; types of thermal conductivity; Wiedmeann-Franz law; Super conductivity; applications.
2 DIELECTRIC MATERIALS: Behavior of dielectric materials in static electric field; Dipole moments; Polarization; Dielectric constant; Polarizability, Susceptibility; mechanisms of polarization; behavior in alternating field; dielectric loss; loss tangent types of dielectric and insulating materials; electrostriction; Piezo-electricity.

3 MAGNETIC MATERIALS: Permeability; Magnetic susceptibility; magnetic moment; origin of magnetic dipole moment; angular momentum; Magnetization; Classification of magnetic materials-Para; Dia, ferro, antiferro; and ferri; Langevin’s theory of dia; Curie-Weiss law; spontaneous magnetism; domain theory; Magnetosriction; eddy current and hysteresis losses; applications.

4 SEMICONDUCTORS: Review of Si and Ge as semi-conducting materials; Continuity Equation; PN junction; Drift and Diffusion; Diffusion and Transition capacitances of P-N junction; breakdown mechanisms; ZENER diode.

5 OPTICAL PROPERTIES OF MATERIALS: Optical properties of metals; semiconductors and insulators; Phosphororesentce; Luminiscense; Phosphors for CRO; display material for LCD; LED; solar cells and photo-detectors.

6 SEMICONDUCTOR DEVICES: Brief introduction to Planar Technology for device fabrication; BJT; JFET; MOSFETS.

7 POWER DEVICES: Thyristor; IGBT; VMOS; UJT; GTO; their working principles and characteristics.

TEXT BOOK

REFERENCE BOOKS
1 **INTRODUCTION**: Vector Relation in rectangular; Cylindrical; Spherical and general curvilinear coordinate system. Concept and physical interpretation of gradient; Divergence and curl; Gauss’s Divergence and Stoke’s theorems.

2 **ELECTROSTATICS - I**: Electric field intensity; flux density and polarization; Electric field due to various charge configurations. Potential functions and displacement vector.

3 **ELECTROSTATICS-II**: Gauss’s law; Poisson’s and Laplace’s equation and their solution in rectangular coordinates; Uniqueness theorem; Capacitance and electrostatics energy; methods of electrostatics images; boundary conditions.

4 **MAGNETOSTATICS – II**: Magnetic field vector; Magnetic field intensity; flux density and magnetization.

5 **MAGNETOSTATICS –II**: Bio-Savart’s law; Ampere’s law; Magnetic vector potential; Energy stored in magnetic field; Boundary conditions ; Analogy between electric and magnetic field;

6 **TIME VARYING FIELDS**: Faraday’s law; Displacement currents and equation of continuity.Maxwell’s equations; Uniform plane wave in free space; Reflections; refraction and polarization of UPW; surface impedance; standing wave ratio. Poynting theorem and power considerations.

7 **ELECTROMAGNETIC FIELDS**: EM wave in Dielectrics; Conductors and Magnetic Materials and Skin effect.

**TEXT BOOK**

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<table>
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1. **ELECTRONIC INSTRUMENTS**: Instruments for measurement of voltage; current and other circuit parameters; Q; meters; R.F. power measurements; introduction to digital meters.

2. **OSCILLOSCOPE**: Block diagram; study of various stages in brief; high frequency CRO considerations. Sampling and stoppage oscilloscope.

3. **GENERATION and ANALYSIS OF WAVEFORMS**:

   Block diagram of pulse generators; signal generators; function generators wave analysers; distortion analysers; spectrum analyser; Harmonic analyser; introduction to power analyser.

4. **FREQUENCY and TIME MEASUREMENT**: Study of decade counting Assembly (DCA); frequency measurements; period measurements; universal counter; introduction to digital meters.

5. **TRANSDUCERS**: Classification; Transducers of types: RLC photocell; thermocouples etc. Basic schemes of measurement of displacement; velocity; acceleration; strain; pressure; liquid level and temperature.

6. **DISPLAY DEVICES**: Nixie tubes; LED’s LCD’s; discharge devices; data acquisition and conversion system.

7. **INTRODUCTION TO SIGNAL CONDITIONING**:

   DC signal conditioning system; AC signal conditioning system; data accusation and conversion system.

**TEXT BOOK**


**REFERENCE BOOKS**

1. INTRODUCTION TO DATA STRUCTURES:
Definition of data structures and abstract data types; polymorphic data types; linear vs. non-linear data types; primitive vs. non-primitive data types; static and dynamic implementations; arrays, 2, 3 and multi-dimensional arrays; examples and real life applications.

2. RUNNING TIME: Time complexity; Big Oh notation; running times; best case, worst case, average case; factors depends on running time; introduction to recursion; divide and conquer algorithm; evaluating time complexity.

3. STACKS AND QUEUES: Stacks: definition, array based implementation of stacks, linked list based implementation of stacks; examples: infix, postfix, prefix representation; conversions, applications; definition of queues; array based implementation of queues

4. LINKED LISTS: Lists; linked list implementation of stacks and queues; circular implementation of queues and singly linked lists; straight / circular implementation of doubly linked queues; priority queues; applications.

5. TREES: Definition of trees and binary trees; properties of binary trees and implementation; binary traversal pre-order, post-order, in-order traversal; binary search trees; implementations; threaded trees; balanced multi way search trees; AVL trees; implementations

6. GRAPHS: Definition of undirected and directed graphs and networks; array based implementation of graphs; adjacency matrix; path matrix implementation; linked list representation of graphs; shortest path algorithm, graph traversal: breadth first traversal, depth first traversal; hash tables, hash function; implementations and applications.

7. SORTING AND SEARCHING ALGORITHMS:
Introduction, sorting by exchange, selection, insertions, bubble sort, straight selection sort, efficiency of above algorithms; shell sort, performance of shell sort, merge sort, merging of
sorted arrays and algorithms; quick sort algorithm analysis, heap sort: heap construction, heap sort, bottom – up, top – down heap sort approach; searching algorithms: straight sequential search, binary search (recursive & non–recursive algorithms)

TEXT BOOK

REFERENCE BOOKS

WEB REFERENCES

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<th>L T P</th>
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LIST OF EXPERIMENTS
1. To find the roots of non-linear equation using Bisection method.
2. To find the roots of non-linear equation using Secant method.
3. To find the roots of non-linear equation using Newton’s method.
4. To solve the system of linear equations using Gauss-Elimination method.
5. To solve the system of linear equation using Gauss-Seidal iteration method.
6. To find the values of function at a particular point using Newton’s forward formula.
7. To find the values of function at a particular point using Newton’s backward formula.
8. To find the values of function at a particular point using Lagrange’s interpolation formula.
9. To integrate numerically using Trapezoidal rule.
10. To integrate numerically using Simpson’s rule.
11. To find the solution of o.d.e (ordinary differential equation) by Euler’s method.
12. To find the solution of o.d.e by Runge-Kutta method.
13. To find the numerical solution of Laplace equation.
14. To find the numerical solution of heat equation.
15. To find the numerical solution of wave equation.

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<th>EC-252</th>
<th>Electrical Engineering Materials and Semi-Conductor Devices Lab</th>
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LIST OF EXPERIMENTS
1. To study V-I characteristics of diode, and its use as a capacitance.
2. Study of the characteristics of transistor in Common Base configuration.
3. Study of the characteristics of transistor in Common Emitter configuration.
4. Study of V-I characteristics of a photo-voltaic cell.
5. Study of characteristics of MOSFET/JFET is CS configuration.
6. To plot characteristics of thyristor.
7. To plot characteristics of UJT.
8. To plot characteristics of diac & Triac.
9. Study of loss factor in a dielectric by an impedance bridge.
10. Study of photo-resist in metal pattern for planar technology.

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<th>EC-254</th>
<th>Electronic Measurement and Instrumentation Lab</th>
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LIST OF EXPERIMENTS
1. Measurement of displacement using LVDT.
2. Measurement of distance using LDR.
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**Objective:** To strengthen the four language skills and to refine the presentation skills; to learn report writing and to practice the etiquettes for better personality.

**UNIT 1:** Semantics:- Phrasal verbs & idioms, their usage in sentences; foreign words & phrases, their meaning and sentence formation; abbreviations & acronyms

**UNIT 2:** Remedial grammar:- Types of verb; Active voice & passive voice; Types of sentences based on mood and structure; Reported speech; Sentence correction based on tense, voice & reported speech

**UNIT 3:**- Listening & Reading Skills: Listening & hearing; Barriers in listening; Effective listening; Listening exercises; Types of reading; Reading with correct tone & intonation; Reading comprehension; Paraphrasing; Summarizing the passage

**UNIT 4:** Oral communication:- Presentation; Self introduction in front of the Interview board; Public speaking tips; Effective PPt. Presentation on topics of current importance
UNIT 5: Writing skills & Internal communication:- Meeting; Agenda; Minutes; Notice; Memo; Memorandum; Circular:- Paragraph writing; Job application & Resume; Introduction to Report writing; Structure & objective of different types of reports; Report writing; Press report

UNIT 6: Business Correspondence: Note-Making, Precis writing; Types of Business letters; Letter of Appointment; Resignation Letter; Formal Invitation

UNIT 7: Professional skills:- Interpersonal skill; Job interview; Team work; Leadership qualities; Case studies on the above professional skills

Prescribed Text book

1. Technical Communication Principles & Practice (2nd Ed.) by Meenakshi Raman & Sangeeta Sharma published by Oxford University

2. The Functional Aspects of Communication Skills by Dr.Prajapati Prasad published by S.K.Kataria & Sons


SUGGESTED READING:

1. Language in Use (Upper intermediate Level, Adrian Doff Christopher Jones, Cambridge University Press


5. The sounds of English, Veena Kumar, Makaav Educational Software, New Delhi.


1. **PARTIAL DIFFERENTIAL EQUATIONS:**
Formation of partial differential equations; Lagrange’s linear partial differential equations; first order non-linear partial differential equation; Charpit’s method; method of separation of variables and its applications to wave equation and one dimensional heat equation, two dimensional heat flow, steady state solutions only.

2. **SPECIAL FUNCTIONS:** Special functions, Bessel’s equation and Legendre’s equation and its recurrence formulae.

3. **TESTING OF HYPOTHESIS:** Testing of hypothesis; tests of significance for large formulation; Student’s t-distribution (application only); Chi-Square test of goodness of fit.

4. **LIMIT AND CONTINUITY:** Limit and continuity of a complex function, differentiability and analyticity; Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic; polar form of Cauchy-Riemann equations; harmonic functions; application to flow problems.

5. **COMPLEX FUNCTIONS:** Integration of complex function; Cauchy-Integral theorem and formula; power series; radius and circle of convergence; Taylor’s, Maclaurin’s and Laurent’s series; zeros and singularities of complex functions.

6. **RESIDUE THEOREM:** Residue theorem, evaluation of real integrals using residues (around unit and semi circle only); bilinear transformation and conformal mapping.

7. **LINEAR PROGRAMMING:** Formulation of linear programming problems; solving linear programming problems using (i) graphical method (ii) simplex method (iii) dual simplex method.

**TEXT BOOK**

**REFERENCE BOOKS**
1. INTRODUCTION: Definition of economics; difference between micro and macro economics; central problems of economy including PP curve; factors of production
2. UTILITY: concept and measurement of utility; Law of Diminishing Marginal Utility (DMU); derivation of Law of Demand from Law of DMU; Law of Equimarginal Utility (EMU) – its practical applications
3. DEMAND: What is demand and supply; shift in demand and extension of demand; law of demand and law of supply; demand function; demand schedule; elasticity of demand; measurement of elasticity of demand; factors affecting elasticity of demand; role of demand and supply in price determination and effect of changes in demand and supply on prices
4. PRODUCTION FUNCTIONS: Meaning of production and production functions; Law of Variable Proportion; returns to scale, internal and external economies and diseconomies of scale.
5. COSTS: Various concepts of costs: fixed cost, variable cost, average cost, marginal cost, opportunity cost; shape of average cost, marginal cost, total cost etc. in short run and long run.
6. MARKET STRUCTURES: What is market; main features of perfect competition; monopoly; oligopoly; monopolistic competition.
7. MACRO ECONOMICS: Macro economics: brief concepts of GDP, GNP, NI, per capita income; inflation; privatization; globalization (merits & demerits); elementary concepts of VAT, WTO, GATT and TRIPS

TEXT BOOK

REFERENCE BOOKS

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1. **TOPOLOGY**: Principles of network topology; graph matrices; network analysis using graph theory; cut and tie set.

2. **LAPLACE TRANSFORMATION and ITS APPLICATION IN CIRCUIT ANALYSIS**: Introduction; Laplace transformation of derivative; integral; common forcing function; application of Laplace transform in circuit analysis; step response of RL; RC series and parallel circuit; impulse response of RL; RC Series and parallel circuit.

3. **TRANSIENT RESPONSE**: Introduction; Transient Response of RC; RL; RLC Circuits to various excitation signals such as step; ramp; impulse and sinusoidal excitations using laplace transform.

4. **NETWORK FUNCTIONS**: Terminal pairs or Ports; Network functions for one-port and two-port networks; poles and zeros of Network functions; Restrictions on pole and zero Locations for driving point functions and transfer functions; Time domain behavior from the pole-zero plot.

5. **CHARACTERISTICS AND PARAMETERS OF TWO PORT NETWORKS**: Relationship of twoport variables; short-circuit Admittance parameters; open circuit impedance; parameters;Transmission parameters; hybrid parameters; relationships between parameter sets; Interconnection of two port networks.

6. **TYPES OF FILTERS AND THEIR CHARACTERISTICS**: Filter fundamentals; highpass; low-pass; band-pass; and band-reject Filters.

7. **NETWORK SYNTHESIS**: Positive real functions; synthesis of one port and two port networks; elementary ideas of Active networks.

TEXT BOOKS

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1. FUNDAMENTALS OF DIGITAL TECHNIQUES:
Digital signal; logic gates: AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR; Boolean algebra. Review of Number systems. Binary codes: BCD; Excess- 3; Gray; EBCDIC; ASCII; Error detection and correction codes.

2. COMBINATIONAL DESIGN USING GATES:
Design using gates; Karnaugh map and Quine Mcluskey methods of simplification.

3. COMBINATIONAL DESIGN USING MSI DEVICES:
Multiplexers and Demultiplexers and their use as logic elements; Decoders; Adders/Subtractors; BCD arithmetic circuits; Encoders; Decoders/Drivers for display devices.

4. SEQUENTIAL CIRCUITS: Flip Flops : S-R; J-K; T; D; master-slave; edge triggered; shift registers; sequence generators; Counters; Asynchronous and Synchronous Ring counters and Johnson Counter; Design of Synchronous and Asynchronous sequential circuits.
5. **DIGITAL LOGIC FAMILIES:** Switching mode operation of p-n junction; bipolar and MOS. devices. Bipolar logic families:RTL; DTL; DCTL; HTL; TTL; ECL; MOS; and CMOS logic families. Tristate logic; Interfacing of CMOS and TTL families.

6. **A/D AND D/A CONVERTERS:** Sample and hold circuit; weighted resistor and R-2 R ladder D/A Converters; specifications for D/A converters. A/D converters : successive approximation; counting type.

7. **PROGRAMMABLE LOGIC DEVICES:**

   ROM; PLA; PAL; PEEL; GAL; FPGA and CPLDs.

**TEXT BOOK**


**REFERENCE BOOKS**


<table>
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<tr>
<th>EC-209</th>
<th>Communication System</th>
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1. **INTRODUCTION TO COMMUNICATION SYSTEMS:** Block diagram of basic Communication system.; elements of basic communication system; modes and media of communication; Fourier analysis of signals; modulation and need for Modulation.

2. **AMPLITUDE MODULATION:** Linear modulation; amplitude modulation; depth of modulation; bandwidth and power calculations; generation and demodulation of AM, DSBSC, SSB and VSB.
3. **ANGLE MODULATION:** Frequency and Phase modulation; narrow band and wide band FM; transmission bandwidth of FM; power calculations; direct and indirect methods of FM signal generation; demodulation of FM signals; slope detector; balanced slope detector; Foster-seely discriminator; pre-emphasis and De-emphasis.

4. **RECEIVERS:** TRF and super heterodyne receiver RF, mixer and IF stages; image frequency; choice of IF AGC; receiver characteristics & measurements; fading and diversity reception; special features of Communication Receivers.

5. **PULSE ANALOG MODULATION:** Sampling theory; PAM, PWM and PPM-generation and detection; TDM &FDM.

6. **PULSE DIGITAL MODULATION:** PCM; Signal to quantization noise ratio of a PCM; electrical representation of binary data; on-off, RZ, NRZ, Differential encoding; Manchester coding. DPCM. DM. ADM.

**DIGITAL MODULATION:** ASK, FSK, BPSK, QPSK.

7. **NOISE IN COMMUNICATION SYSTEMS:** External noise; internal noise; S/N ratio. noise figure (Qualitative analysis).

**TEXT BOOK**


**REFERENCE BOOKS**

Hill, 2002.

### LIST OF EXPERIMENTS

1. Transient response of RC circuit.
2. Transient response of RL circuit.
3. To find the resonance frequency, Band width of RLC series circuit.
4. To calculate and verify “Z” parameters of a two port network.
5. To calculate and verify "Y" parameters of a two port network.
6. To determine equivalent parameter of parallel connections of two port network.
7. To plot the frequency response of low pass filter and determine half-power frequency.
8. To plot the frequency response of high pass filter and determine the half-power frequency.
9. To plot the frequency response of band-pass filter and determine the band-width.
10. To calculate and verify "ABCD" parameters of a two port network.
11. To synthesize a network of a given network function and verify its response.
12. Introduction of P-Spice

### LIST OF EXPERIMENTS

1. Study of TTL gates – AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR.
2. Design and realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer and Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R; J-K; T and D type flip flops.
6. To verify the operation of bi-directional shift register.
7. To design and verify the operation of 3-bit synchronous counter.
8. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops and drive a seven-segment display using the same.
9. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops and drive a seven-segment display using the same.
10. To design and realize a sequence generator for a given sequence using J-K flip-flops.
11. Study of CMOS NAND and NOR gates and interfacing between TTL and CMOS gates.
12. Design a 4-bit shift-register and verify its operation. Verify the operation of a ring counter and a Johnson counter.

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LIST OF EXPERIMENTS

2. Study of Frequency Modulation and determination of Modulation index.
3. Study of Phase Modulation.
5. Study of Pulse Width Modulation.
7. Study of Pulse Code Modulation.
8. Study of frequency Shift Keying.
9. Study of ASK and QASK.
10. Study of PSK and QPSK.

11. Project related to the scope of the course.