PEOPLE'S UNIVERSITY, BHOPAL

Programme: **B. Tech. (Electronics and Communication Engineering)** Semester: **IV**

Subject Title	Subject Code	Credits			Theory		
		L	T	P	Externals (70)	Internals (30)	Total (100)
Engineering Mathematics-III	BT- 401	3	1	-			Min: 40 (D Grade)

Duration of Theory (Externals): 3 Hours
Theory Internal - Max Marks: 30
Best of Two Mid Semester Test – Max Marks: 20
Assignment / Quiz – Max. Marks: 10

Unit	Contents (Theory)
I	**FUNCTIONS of COMPLEX VARIABLES:** Analytic functions, Harmonic Conjugate, Cauchy – Riemann Equations, Line integral, Cauchy's theorem, Cauchy's Integral formula, Singular points, Poles and Residues, Residue theorem and Evaluation of Real Integral
II	**NUMERICAL ANALYSIS:** Difference operators, Errors and Approximations, Interpolation, Inverse interpolation, Numerical differentiation, Numerical Integration by using Simpson's method, Weddel's rule and Trapezoidal Rule.
III	**SOLUTION OF ALGEBRIAC & SIMULTANEOUS EQUATIONS :** Solutions of algebraic and transcendental equations(Regular False, Newton-Raphson, Iterative, Graffe's root squaring methods) and Solutions of simultaneous algebraic equations (Gauss Elimination, Gauss Jordan, Gauss Iterative, Jacobi,Gauss Seidel and Crout's Traingularization).
IV	**SOLUTION TO DIFFERENTIAL EQUATIONS:** Solutions of ordinary differential equations (Taylor's Series, Picard's Method, Euler Method, Modified Euler's method, Runge Method and Runge Kutta Method).
V	**OPTIMIZATION by LINEAR PROGRAMMING:** Introduction, 2 Variable Problems, Solution by Graphical and Simplex Methods, Concept of Degeneracy and Duality, Simple 3 Variable Transport and Assignment Problems and Modeling into LPP.

REFERENCES :

1. Higher Engineering Mathematics by B.S. Grewal,Khanna Publications
2. D.C. Aggarwal "Engineering Mathematics II
3. Numerical Methods using Matlab by J.H.Mathews and K.D.Fink, P.H.I.
4. Numerical Methods for Scientific and Engg. Computation by MKJain, Iyengar and RK Jain, New Age International Publication
5. Numerical Methods using Matlab by Yang,Wiley India
6. Pobability and Statistics by Ravichandran ,Wiley India
7. Mathematical Statistics by George R., Springer

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Subject Title	Subject Code	Credits			Theory		
		L	T	P	Externals (70)	Internals (30)	Total (100)
Control System	ECT- 402	3	1	-			Min: 40 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal - Max Marks: 30

Best of Two Mid Semester Test – Max Marks: 20
Assignment / Quiz – Max. Marks: 10

Unit	Contents (Theory)
I	**Basic Control System** Terminology and Classification of control System, Examples of control System, Transfer Function of Linear Control System, Block Diagram Representation, Signal flow Graph Techniques. **Mathematical Modeling of Electrical Network**: AC and DC Servomotors, Error Detector, Stepper Motor, Optical Encoder, Linearization.
II	**Sensitivity of control Systems**, Effects of Feedback on gain and time constant, pole location, bandwidth, Sensitivity, Stability, and Disturbance signal, Control over System Dynamics by use of Feedback. **Time Response Analysis**- Standard Test Signals, Time Response of 1st Order System, Model of Prototype DC Position Control System, Time Response of Prototype 2nd Order System, Performance Specification of 2nd Order System, Steady-State Errors and Error Constants, Effects of Additions of Poles and Zeros to Open Loop and Closed Loop System, Design Specification of 2^{nd} Order System and Higher-Order System, Performance Indices, Optimal Control System.
III	**Time Domain Stability Analysis**- Concept of Stability of Linear Systems, Effects of Location of Poles on Stability, Necessary Conditions for Stability, Routh-Hurwitz Stability Criteria, Relative Stability Analysis, Root Locus Concept, Guidelines for Sketching Root-Locus,. Frequency Domain Stability Analysis- Performance Specification in Frequency Domain, Co-relation between frequency Domain and Time Domain, Bode Plot, Minimum-Phase and Non-Minimum Phase System, Polar Plots, Inverse Polar Plot, Nyquist Stability Criterion, Assessment of Relative Stability (Phase Margin, Gain Margin and Stability), Constant-M and N Circle, Nichols Chart.
IV	**Approaches to System Design**, Types of Compensation, Design of Phase-Lag, Phase Lead and Phase Lead-Lag Compensators in Time and Frequency Domain, Proportional, Derivative, Integral and PID Compensation.
V	**Concept of State, State Variables and State Model**, State Space Representation of Systems, Block Diagram for State Equation, Transfer Function Decomposition, Solution of State Equation, Transfer Matrix, Relationship between State Equation and Transfer Function, Controllability and Observability.

References:

1. Nagrath and Gopal : Control System Engineering, New Age International Publishers.
2. Samarjit Ghose : Control Systems Theory and Applications, Pearson Education
3. Distefano; Feedback and Control System (Schaum); TMH
4. B. S. Manke : Linear Control System (with MATLAB Application), Khanna Publishers.
5. Ogata : Modern Control Engineering, PHI

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Subject Title	Subject Code	Credits			Theory			Practical		
		L	T	P	Externals (70)	Internals (30)	Total (100)	Externals (35)	Internals (15)	Total (50)
Electronic Circuits	BT- 423	3	1	2			Min: 40 (D Grade)	Min: 12 (D Grade)	Min: Nil	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal - Max Marks: 30

Best of Two Mid Semester Test –Max Marks: 20
Assignment / Quiz – Max. Marks: 10

Practical Internal - Max Marks: 15

Lab work & Sessional – Max Marks: 10
Assignment / Quiz – Max. Marks: 05

Unit	Contents (Theory)
I	**Amplifier Basics**, Transistor as an amplifier, load line, Q-point and its selection criteria, designing of fixed bias and self-bias, stability of biasing circuits, calculation of stability factor. **Transistor at low frequency**: frequency response, bandwidth, h-parameter analysis of CC, CB and CE configuration, simplified model, gain and impedance calculation of single stage amplifier. **Transistor at high frequency**, high frequency model (hybrid- pie), Parameters and their definition, Miller capacitance and its effect on voltage gain,
II	**Feedback amplifier**: positive and negative feedback loop gain, effect of negative feedback on gain stability, distortion, bandwidth, input and output impedance of amplifier, types of feedback (voltage, current, series and shunt) and their analysis. **Oscillators**: condition of sustained oscillation, RC phase shift, LC (Hartley and Collpit) Oscillators, Wein Bridge, Negative resistance (Tunnel diode and UJT) oscillators, crystal oscillators.
III	**Power amplifier**, classification, operation, analysis and design of Class A, Class B, Class-AB, Class C, transformer coupled, push pull and complementary symmetry amplifiers, power dissipation in transistors (Pdmax rating) and efficiency calculations. **Tuned amplifier** and its applications, Q factor, selectivity and bandwidth, effect of loading, double tuning (synchronous and stagger)
IV	**Cascade amplifiers**, Calculation of gain, Input and output impedance, Effect of Cascading on bandwidth, Transformer, RC and direct-coupled amplifier and their performance. **Darlington connection**, equivalent circuit and Calculation of gain and impedances, Cascade amplifier: advantage, circuit diagram and analysis, feedback pair and applications of BIFET, Bootstrapping technique. **Differential amplifier** - configuration, transfer characteristics, DC analysis, h-parameter analysis, differential and common mode gain, CMRR, constant current source and current mirror, level shift.

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V	**Operational amplifier** (IC741), specifications, ideal and practical characteristics, frequency response, unity gain bandwidth, limitations, slew rate and its effect on full power bandwidth, input offset voltage, bias and offset currents, compensation. **Applications of Op-Amp: I**nverting and non-inverting amplifier Analog computation, summer (inverting and non-inverting), average, integrator, differentiator, scalar, sign changer, phase changer, multiplier, buffer, Differential amplifier, instrumentation amplifier, comparator, Schmitt trigger, precision rectifier, log and antilog amplifier, voltage-to-current and current-to-voltage converter.

References:

1. Millman and Halkias : Integrated electronics, TMH
2. Gayakwad ; OPAMP and Linear Integrated Circuits, Pearson Education
3. Boylestad and Nashelsky : Electronic Devices and Circuit Theory, PHI
4. Sendra and Smith : Microelectronics, Oxford Press
6. Donald A Neamen : Electronic Circuits Analysis and Design, TMH

Name of Practical Experiments

1. To Study the OPAMP as a Summing Amplifier.
2. To Study the OPAMP as a Scaling Amplifier.
3. To Study the operation of Colpitts Oscillator.
4. To Study the operation of Wein Bridge Oscillator.
5. To Study the operation of Hartley Oscillator.
6. To Study the operation of class A amplifier.
7. To Study the operation of Class B amplifier.
8. To Study the differential amplifier.
9. To Study the OPAMP as a Schmitt trigger.
10. To Study the OPAMP as a Logarithmic amplifier.

Procedure for performing the Practical Experiments

All experiments (wherever applicable) should be performed through the following steps.

Step 1: Circuit should be designed/ drafted on paper.

Step 2: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Lab view/ CIRCUIT MAKER).

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.

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Subject Title	Subject Code	Credits			Theory			Practical		
		L	T	P	Externals (70)	Internals (30)	Total (100)	Externals (35)	Internals (15)	Total (50)
Digital Logic Design	ECT-404	3	1	2			Min: 40 (D Grade)	Min: 12 (D Grade)	Min: Nil	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal - Max Marks: 30

Best of Two Mid Semester Test –Max Marks: 20
Assignment / Quiz – Max. Marks: 10

Practical Internal - Max Marks: 50

Lab work & Sessional –Max Marks: 35
Assignment / Quiz – Max. Marks: 15

Unit	Contents (Theory)
I	Introduction. Digital number systems and information representation; arithmetic operations, decimal and alphanumeric codes. POSs & SOPs, Binary logic, Boolean algebra (identities, functions and manipulation), standard forms, simplification.
II	Logic gates, switch-level and logic CMOS implementation, integrated circuits. Combinational logic design: circuits (gate level), design hierarchy and procedures, computer-aided design. Combinational two-level and multi-level implementations. Arithmetic (add, subtract, multiply) and other popular (multiplexers, encoders, decoders) modules. Language-directed combinational design (VHDL).
III	Sequential logic design: latches, flip-flops, state machine design and minimization (Mealy and Moore models), design problems. Language-directed sequential design (VHDL). Registers, Register Transfers and Counters.
IV	Digital Circuit Technologies, RTL/DTL/DCTL/TTL/MOS/CMOS/ECL, analysis of basic circuits in these families, internal architecture of programmable logic devices.
V	Memory system – RAM., ROM, EPROM, EEPROM, PAL, PLDs, PGAs. A/D and D/A conversion techniques and selected case studies.

TEXT /REFERENCES:

1. Morris Mano, Digital Design- Prentice Hall of India Pvt. Ltd
2. H.Taub & D. Schilling, Digital Integrated Electronics, McGraw Hill
3. Douglas L. Perry, VHDL, McGraw Hill, Inc., 2nd Edition, 1993.
4. J.Millman and Halkias, "Integrated Electronics, Analog and Digital Circuits and Systems, Tata McGraw Hill
5. A.Anand Kumar, Digital Electronics, TMH

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Name of Practical Experiments

1. To test and study of operation of all logic Gates.
2. To implementation of basic Gates using Universal Gates.
3. To Study the binary addition by half adder and full adder circuit.
4. To Study the binary subtraction by half subtractor and full subtractor circuit.
5. To Design a BCD to Excess-3 code convertor.
6. To study the verification of Demorgons Theorem.
7. To Study the operation of R-S Flip Flop.
8. To Study the operation of J-K Flip Flop.
9. To Study the operation of MUX/DEMUX.
10. To Study the applications of 555 timer (astable,monostable,Schmitt trigger and VCO)

Procedure for performing the Practical Experiments

All experiments (wherever applicable) should be performed through the following steps.

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Step 2: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Lab view/ CIRCUIT MAKER).

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.

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Subject Title	Subject Code	Credits			Theory			Practical		
		L	T	P	Externals (70)	Internals (30)	Total (100)	Externals (35)	Internals (15)	Total (50)
Analog Communication	ECT-405	3	1	2			Min: 40 (D Grade)	Min: 12 (D Grade)	Min: Nil	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal - Max Marks: 30

Best of Two Mid Semester Test –Max Marks: 20
Assignment / Quiz – Max. Marks: 10

Practical Internal - Max Marks: 50

Lab work & Sessional –Max Marks: 35
Assignment / Quiz – Max. Marks: 15

Unit	Contents (Theory)
I	**Different types of Signals** (Continuous, Discrete, Periodic), Time Domain and Frequency Domain Representation, Introduction to basic Transform Techniques applicable to these Signals. **Dynamic Representation of Systems**: Systems Attributes, Causality linearity, Stability, time invariance. Special Signals, Complex exponentials, Singularity functions (impulse and step functions)..Linear Time-Invariant Systems: Differential equation representation convolution Integral. Discrete form of special functions. Discrete convolution and its properties. Realization of LTI system (differential and difference equations).
II	**Spectral Analysis**: Fourier Technique, Fourier Transform and their Properties, Transform of Gate Signal, Impulse Function and Unit Step Function, Fourier Transform Technique for Periodic Signal, Transform of Train of Pulses and Impulses, Sine and Cosine wave. **Signal Energy and Power**: Spectral Density of various types of signals, Spectra (Parseval's Theorem), Density Spectra of Periodic Gate and Impulse train.
III	**Modulation Techniques**: Need and types of modulation techniques, Amplitude Modulation, Frequency Spectrum, Power Distribution, Modulation by Complex Signal, Low Level and High Level AM Modulators, Linear Integrated Circuit AM Modulators, Suppressed Carrier Generation (Balance/Chopper and Square Law Modulation), SSB Generator (Phase and Frequency Discrimination Method), VSB Transmission and Application. Detection of AM signals: Envelope Detector Circuit, RC Time Constant, Synchronous Detection Technique, Error in Synchronous Detection, SSB signal detection, PLL and its use in demodulation.
IV	**Angle Modulation**: Frequency and Phase Modulation Frequency spectrum, bandwidth requirement, Frequency and Phase Deviation, Modulation Index, NBFM and WBFM, Multiple frequencies FM. FM Modulators: Direct (Parameter Variation Method) and Indirect (Armstrong) Method of frequency modulation. FM Detector: Slope Detector, Foster Seely Discriminator, Ratio Detector and PLL detectors.
V	**Radio Transmitters**: AM transmitter, block diagram and working of Low Level and High Level Transmitters, Trapezoidal Pattern and Carrier Shift, SSB Transmitters, FM transmitters – Frequency Multiplication Applied to FM Signals, FM transmitters. **Radio Receivers**: Block Diagram of Radio Receiver, Receiver Characteristics (Selectivity, Fidelity and Sensitivity), AM Receiver, RF Receiver, Super-heterodyne Receiver, RF Amplifier, Frequency Mixer, AVC and AFC, Image Signal, Intermediate Frequency Selection, Diversity Reception, FM Receiver.

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	Noise : Sources and types of noise and their power density, AWGN, Noise in Angle Modulate System, Figure of Merit for FM, Preemphasis and De-emphasis, Capture Effect, Comparison of Noise Performance of AM and FM.

References:

1. B.P. Lathi : Modern Analog and Digital Communication System, Wiley Eastern limited
2. Taub and Schilling : Principles of communication Systems, TMH
3. Singh and Sapre : Communication Systems, TMH
4. S Haykin : Communication Systems, John Wiley and Sons Inc
5. A Bruce Carlson : Communication System, TMH

Name of Practical Experiments

1. To study of the double sideband AM generation.
2. To Study of the single sideband AM generation.
3. To Study of frequency modulation using varactor diode.
4. To Study of operation of ratio detector.
5. To study of frequency modulation using reactance modulation.
6. To study of SSB AM reception using product detector.
7. To Study of DSB AM reception using envelope detector.
8. To Study of operation of phase loop detector.
9. To Study of the FM detection.
10. To Study of the Preemphasis and de emphasis.

Procedure for performing the Practical Experiments

All experiments (wherever applicable) should be performed through the following steps.

Step 1: Circuit should be designed/ drafted on paper.

Step 2: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Lab view/ CIRCUIT MAKER).

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.

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Subject Title	Subject Code	Credits			Practical		
		L	**T**	**P**	**Externals**	**Internals (50)**	**Total (50)**
Professional Skills –II	**BT- 406**	-	-	2	Nil	Min: 20 (D Grade)	Min: 20 (D Grade)

Practical Internal - Max Marks: 50

Assignment / Quiz – Max. Marks: 50

Contents
Elements of Effective Presentation: Body Language and use of voice during presentation; Dress, Posture, Gestures, Eye contact and facial expression, Connecting with the audience during presentation; Projecting a positive image while speaking; Planning and preparing a model presentation; Organizing the presentation to suit the audience and context; Basics of public speaking; Preparing for a speech. **Stage fright, Voice and language:** Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech. Use of aids –OHP, LCD Projector, white board.

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Subject Title	Subject Code	Credits			Practical		
		L	T	P	Externals (35)	Internals (15)	Total (50)
Java programming	**BT-407**	-	-	2	Min (14)	Min: Nil	Min: (D Grade)

Practical Internal - Max Marks: 15

Lab Performa, Lab Record & Viva –Max Marks: 10

Attendance: – Max. Marks: 05

Unit	Contents *(Practical)*
I	**Introduction to java programming**: Introduction to java, Fundamentals of objects oriented programming, Object and classes , Data abstraction and encapsulation , Inheritance, Polymorphism , dynamic Binding , Java Features compiled and Interprets , Platform Independent and portable ,object orients Distributes , Multithreaded and interactive , High Performance , constant , Variables and data Types, Scope and Variable Operators and Expression , Statements LOPs ,Jumps in Loops (Break continue)
II	**Object oriented Programming with Java Classes and Objects**: Classes, Objects and methods Defining a class, creating object, Accessing class members, visibility control constructor , Methods overloading Static Member <Inheritance ,Overriding Methods ,Final Variable and Methods ,Final classes ,Abstract Method and classers , Array , interfaces, Multiple Inheritance Defining Interface <Extending Interfaces, Accessing Interface Variable ,Packages : Putting classes together system package , Using system package ,Naming convection , certain package accessing a package , using a package , adding a classes a package
III	Advance java features :Multithreading : threads states priorities and thread scheduling , life cycle of a thread synchronization, creating and executing threads , multithreading with GUI , monitors and monitors lock Network ng : Manipulating URLs , reading a file on a web server , socket programming , Security and the networks , RMI , Networking accessing database with JDBC , relational database ,SQL,MYSQL,Oracle,
IV	Advance Java Technologies :Servlets: Overview and architecture, Setting up the apache tomcat server , Handling ,HTTP get requests Deploying a web application , multitier application s, using JDBC form a servlelts java Server pages (JSP),Overview ,First jsp examples , implicit objects ,Scripting Standard Action Directives ,Multimedia : APPlets and application loading , displaying and Scaling , animating a series of iMages ,Loading and Playing audio clips
V	Advanced web/Internet programming (overview):J2ME, J2EE,EJB and XML

References:

1. NaUGHTON & Scghildt " The complete reference java 2 " , Tata McGraw hill
2. Deitel" JAa – How to program " Pearson Education , asia
3. Horstmann & Cornell " Core java 2 " Vaol (I & II) , Sun microsystem .
4. Ivan BNayross " Java 2.0 :BPB publication

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PRACTICALS:

Suggested list of experiments (expandable)

1. Introduction of J2SDK
2. Program to show scope of Variables
3. Program to show concept of CLASS in java
4. Program to show Type Casting in Java
5. Program to show Inheritance
6. Program to Show Polymorphism
7. Program to show Access Specifies(Public, Private, Protected) in java
8. Program to show use and advantage of Contractor
9. Program to show interfacing between two classes
10. Program to add a class to a package
11. Program to show life Cycle of a Thread
12. Program to demonstrate AWT
13. Program to show Hide a Class
14. Program to show Data base Connectivity using Java
15. Program to show "Hello Java" in Explorer using Applet
16. Program to show Connectivity using JDBC
17. Program to demonstrate multithreading using Java
18. Program to demonstrate applet life Cycle
19. Program to demonstrate concept of Servlet

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Subject Title	Subject Code	Credits			Practical		
		L	**T**	**P**	**Externals (35)**	**Internals (15)**	**Total (50)**
Software Lab –II	**ECT- 408**	0	0	4	Min: 14 (D Grade)	Min: Nil	Min: 20 (D Grade)

Practical Internal - Max Marks: 50

Lab work & Sessional –Max Marks: 35
Assignment / Quiz – Max. Marks: 15

Contents (Practical)

MATLAB

Introduction to MATLAB, Study of MATLAB programming environment, Modeling, Design and development of Programs. Programs Related to Analog Communication- (Example-Plots of Different Signals and their Fourier Transforms, Computation of Linear and Cyclic Convolution between Two Signals, Simulation of Different Types of modulation, AM Transmitter and Receiver, FM Transmitter and Receiver, Simulation of a Communication System (Generation, addition of noise and Detection). Programs Related to Control System- Open-Loop and Closed Loop Control System Response using MATLAB, Determining Transient Response, Specification of Second Order System, Effect of PID controller on Control System, Bode Plot, Nyquist Plot and Root Locus Plot.

References:

1. Chapman Stephen J.: MATLAB Programming for Engineers, 3rd Edition, Thomson /Cengage.
2. Rudra Pratap: Getting Started with MATLAB 7, Oxford University Press (Indian Edition).
3. Palm; Matlab 7.4; TMH.
4. Proakis John G.: Contemporary Communication System Using MATLAB; Thomson Vikas Pub.
5. B.S. Manke: Linear Control Systems - with MATLAB Application, Khanna Publishers.
6. Simulation/Designing Software Manuals.
7. Hassan S; Automatic Control Systems (with MATLAB Programming); Kataria and Sons, Delhi.

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Name of Practical Experiments

1. Basics of MATLAB.
2. Basic operations in MATLAB.
3. Basic Vector operation.
4. Basic Matrix Operation.
5. Basic operations on complex numbers.
6. Study of Polynomial evaluation.
7. Study of use of structures.
8. Study of use of functions.
9. Study of solution of liner differential equation.
10. Study of commonly used toolbox.

Procedure for performing the Practical Experiments

All experiments (wherever applicable) should be performed through the following steps.

Step 1: Circuit should be designed/ drafted on paper.

Step 2: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Lab view/ CIRCUIT MAKER).

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.