University Institute of Technology (UIT)
Silverwood Estate, H. P. University Shimla-171005
(NAAC accredited "A-Grade" University)

Syllabus
Bachelor of Technology

In

Electronics & Communication Engineering

B.Tech. (Electronics and Communication Engineering) Second Year

Semester III

SN	Cat.	Code	Course Title	Hours per week			Credits	Marks	
				L	T	P	C	Ext.	Int.
1	PCC	ECE-3001	Analog Communication systems	3	1	0	3	100	50
2	PCC	ECE-3002	Analog Electronics	3	1	0	3	100	50
3	PCC	ECE-3003	Digital Electronics	3	1	0	3	100	50
4	PCC	ECE-3004	Signals and Systems	3	1	0	3	100	50
5	ESC	ES-3005	Mathematics-III	3	1	0	3	100	50
6	HSMC	HSMC-3001	Principles of Engineering Economics	2	1	0	2	100	50
7	ESC	ECE-3051	Analog Communication lab	0	0	2	1	50	50
8	PCC	ECE-3052	Analog Electronics Lab	0	0	2	1	50	50
9	PCC	ECE-3053	Digital Electronics lab	0	0	2	1	50	50
	Total			**29**			**20**	**1200**	

***Vocational Training of 4 weeks after third semester with satisfactory outcome**

Semester IV

SN	Cat.	Code	Course Title	Hours per week			Credits	Marks	
				L	T	P	C	Ext.	Int.
1	PCC	ECE-4001	VLSI Technology	3	1	0	3	100	50
2	PCC	ECE-4002	Linear integrated Circuits	3	1	0	3	100	50
3	PCC	ECE-4003	Digital Communication and Systems	3	1	0	3	100	50
4	PCC	ECE-4004	Communication Theory	3	1	0	3	100	50
5	PCC	ECE-4005	Electromagnetic Field Theory	3	1	0	3	100	50
6	HSMC	HSMC-4001	Organizational Behavior	2	1	0	2	100	50
7	PCC	ECE-4051	Circuit Design and Simulation lab	0	0	2	1	50	50
8	PCC	ECE-4052	Linear Integrated Circuit	0	0	2	1	50	50
9	PCC	ECE-4053	Digital Communication and Systems Lab	0	0	2	1	50	50
	Total			**29**			**20**	**1200**	

***Vocational Training of 4 weeks after fourth semester with satisfactory outcome**

L	–	No of lectures per week
T	–	No of tutorials per week
P	–	No of practical per week
C	–	Credits
Cat	–	Course category

Course Category and Definition:

Course Category	Definitions
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional core courses

Detailed course contents of 3rd semester

Course Code	**ECE-3001**	**Credits-3**	**L-3, T-1, P-0**
Name of the Course	**Analog Communication Systems**		
Lectures to be Delivered			
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

For Paper Setters: The question paper will consist of five sections A, B, C, D &E.
Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of thetotal marks of the semester end examination for the course.
For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non- programmable calculators isallowed.

SECTION-A

Analog Modulation Techniques: Introduction, Theory of Amplitude Modulation; AM Power Calculations, AM Modulation with a Complex wave, Theory of Frequency Modulation (FM); Spectra of FM Signals, Narrow Band and Wide Band FM, Theory of Phase Modulation, Comparison of AM and FM, Comparison of PM and FM, Noise and Frequency Modulation, Pre-emphasis and De-emphasis**.**

SECTION-B

AM Transmission/AM Reception: Introduction, Generation of Amplitude Modulation, Basic Principles of AM Generation; Square law Diode Modulation, Vander Bijl Modulation, Suppressed Carrier AM Generation, Ring Modulator, Balanced Modulator. Tuned Radio Frequency (TRF) Receiver, Basic Elements of AM Super-heterodyne receiver; RF Amplifiers Characteristics-Sensitivity, Selectivity, Image Frequency Rejection, Mixers Tracking and Alignment, Local Oscillator, IF Amplifier, AM Detectors; Envelope or Diode Detector, AGC, AM Receiver using Transistors Communication Receiver.

SECTION-C

FM Transmission/FM Reception: Generation of FM by Direct Methods. Indirect Generation of FM; The Armstrong Method, FM Stereo Transmission. FM Receiver Direct Methods of Frequency Demodulation; Slope Detector, Travis Detector, Foster Seely or Phase Discriminator, Indirect methods of FM Demodulation; FM Detector using PLL and Stereo FM Multiplex Reception.

SECTION-D

SSB Transmission/SSB Reception: Advantages of SSB transmission, Generation of SSB; Independent Side-Band Systems (ISB), Vestigial Side-Band Modulation (VSB).SSB Product Demodulator, Balanced Modulator as SSB Demodulator, ISB/Suppressed Carrier receiver.
P**ulse Modulation Transmission and Reception**: Introduction, Pulse Amplitude Modulation (PAM),PAM Modulator Circuit, Demodulation of PAM Signals, Pulse Time Modulation (PTM); Pulse Width Modulation (PWM), Pulse Position Modulation (PPM),pulse Code Modulation(PCM).Quantization Error

Recommended Books

1. George Kennedy, “Electronic Communication System” 4th edition, McGraw- Hill, 2000.
2. Gary M. Miller and Jeffery S. Beasley, “Modern Electronic Communications” PHI, 2009.
3. Simon Haykin, “Communication Systems” 3rd edition, Wiley Publishers, 2007.
4. Wayne Tomasi, “Electronics Communication systems” 5th edition, Pearson Publishers, 2008.
5. Proakis, “Communication Systems”4th Edition, McGraw-Hill Publications.

Course Code	**ECE-3002**	**Credits-3**	**L-3, T-1, P-0**
Name of the Course	**Analog Communication Systems**		
Lectures to be Delivered			
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

For Paper Setters: The question paper will consist of five sections A, B, C, D &E.
Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non- programmable calculators is allowed.

SECTION-A

Low Frequency Transistor Amplifier: Equivalent Circuit of BJT using h-parameter for CB, CE and CC & configuration, Calculation of Transistor Parameter for CB, CE & CC using h-parameters, Comparison of Transistor Amplifier Configuration.

Multistage Amplifier: General Cascaded System, RC Coupled Amplifier and its Frequency Response, Merits and Demerits, Cascade Amplifier, Darlington Compound Configuration, Multistage Frequency Effect.

SECTION-B

High Frequency Response of Transistor Amplifier: High Frequency Model for CE Configuration, Approximate CE High Frequency Model with Resistive Load, CE Short Circuit Current Gain, HF Current Gain with Resistive Load.

Large Signal Amplifier: Analysis and Design of class A, B, AB, C Amplifiers, Push-pull Amplifiers, Transformer Less Output Stages, Distortion Calculations

SECTION-C

Tuned Amplifier: General Behaviour of Tuned Amplifiers, Series and Parallel Resonant Circuit, Calculations of Circuit Impedance at Resonance, Variation of Impedance with Frequency, Q Factor of a Circuit & Coil, Bandwidth of Series and Parallel Resonant Circuit, Single Tuned Amplifiers, Voltage Gain and Frequency Response of Single Tuned Amplifiers, Double Tuned Amplifiers

SECTION-D

Feedback Amplifier: Feedback concept, Characteristics of Negative and Positive Feedback, Effect of Negative and Positive Feedback on Input Impedance, Output Impedance, Gain, Noise and Frequency Response.

Oscillators: Classification of Oscillators, Frequency Stability of Oscillatory Circuits, Tuned based Oscillators, Hartley Oscillator, Colpitt Oscillators, Clapp Oscillator, Crystal Oscillator, Phase Shift Oscillator and Wein Bridge Oscillator

Recommended Books

1. Integrated Electronics: Analog and Digital Circuits and Systems by J. Millman and C. Halkias, Mc Graw-Hill, Inc.
2. Electronic Devices & Circuit Theory by R. Boylestad and L. Nashelsky, Pearson.
3. Microelectronic Circuits by A. Sedra and K. Smith, Oxford University Press.

Course Code	**ECE-3003**	**Credits-3**	**L-3, T-1, P-0**
Name of the Course	**Digital Electronics**		
Lectures to be Delivered			
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

For Paper Setters: The question paper will consist of five sections A, B, C, D &E.
Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non- programmable calculators is allowed.

SECTION-A

Number Systems And Boolean Algebra: Number systems,Addition, Subtraction using 1's & 2's complements and using 9's&10's complements, Binary codes, Error detecting and Correcting codes, Theorems of Boolean algebra, Canonical forms, Logic gates.

SECTION-B

Combinational Circuits: Representation of logic functions, Simplification using Karnaugh map, Tabulation method, Implementation of combinational logic using standard logic gates, Multiplexers and Demultiplexers, Encoders and Decoders, Code Converters, Adders, Subtractors, Parity Checker and Magnitude Comparator.

SECTION-C

Sequential Circuits: Flip flops - SR, JK, D and T flip flops - Level triggering and edge triggering, Excitation tables - Counters - Asynchronous and synchronous type Modulo counters, ~~design with state equation state diagram,~~ Shift registers, type of registers, ~~circuit diagrams~~
Digital Logic Families: Introduction to bipolar Logic families: RTL, DCTL, DTL, TTL, ECL and MOS Logic families: NMOS, PMOS, CMOS, Details of TTL logic family - Totem pole, open collector outputs, TTL subfamilies, Comparison of different logic families.

SECTION-D

D/A And A/D Converters: Weighted resistor type D/A Converter, Binary ladder D/A converter, Steady state accuracy test, D/A accuracy and resolution, Parallel A/D Converter, counter type A/D converter, Successive approximation A/D converter, Single and Dual slope A/D converter, A/D accuracy and resolution.
Semiconductor Memories: Memory organization, Classification, and characteristics of memories, Sequential memories, ROMs, R/W memories, Content Addressable memories, Charged-Coupled Device memory, PLA, PAL,PROM and Gate Array.

Recommended Books

1. Mano M. Morris, "Digital Design", 3rd edition, Pearson Education 2006.
2. Jain R. P. "Modern Digital Electronics", 3rd edition, Tata McGraw-Hill 2003.
3. Malvino and Leach "Digital principles and Applications", 5th edition, Tata McGraw Hill, 2003.
4. James W. Bignell and Robert Donovan, "Digital Electronics", 5th edition, Delmar Publishers, 2007.
5. Flecther "An Engineering Approach to Digital Design", 1st edition, PHI, 2009.

Course Code	**ECE-3004**	**Credits-3**	**L-3, T-1, P-0**
Name of the Course	**Signals and Systems**		
Lectures to be Delivered			
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

For Paper Setters: The question paper will consist of five sections A, B, C, D &E.
Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non- programmable calculators is allowed.

SECTION-A

Systems And Signal Analysis: Detailed Classification of Signals and Systems, Fourier Series and its properties, Fourier transform and its properties along with applications, Discrete Time Fourier Series (DTFS) and Discrete Time Fourier Transform (DTFT).

SECTION-B

Correlation and Spectral Density: Definition of Correlation and Spectral Density, Analogy between correlation, covariance and convolution, conceptual basis, auto-correlation, cross correlation, energy/power spectral density, properties of correlation and spectral density, inter

SECTION-C

Random Signal Theory: Introduction to Probability Theory, Definition of Probability of Random Events. Joint and Conditional Probability, Probability Mass Function, Statistical Averages. Probability Density Functions (PDF) and Statistical Averages, mean, moments and expectations, standard deviation and variance. Probability models: Uniform, Gaussian, Binomial. Examples ofPDF, Transformation of Random Variables. Random Processes, Stationary and Ergodicity.

SECTION-D

Introduction To Noise: Thermal Noise, Shot noise, Partition noise, Flicker noise, Gaussian Noise, Noise in Bipolar Junction Transistors (BJTs), FET noise. Equivalent input noise, Signal to Noise Ratio (SNR), Noise Temperature, Noise equivalent Bandwidth, Noise Figure. Experimental determination of Noise Figure, Pulse Response and Digital Noise and its elimination.

Signal Transmission Through Linear Networks: Convolution Theorem and its graphical interpretation. The Sampling Theorem, Low Pass and Band Pass Networks, Matched Filter, Enveloped detector.

Recommended Books

1. B P Lathi, "Digital and Analog Communication Systems" 4th edition, Oxford University Press, 2000.
2. Ravi Kumar , " Signals and Systems" PHI learning, 2009.
3. Simon Haykin , "Signals and Systems" 2nd edition, Wiley, 2008.
4. George R Cooper, "Probabilistic methods of Signals and System Analysis" 3rd edition, 2010.

Course Code	ES-3005	Credits-3	L-3, T-1, P-0
Name of the Course	Mathematics		
Lectures to be Delivered			
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

Instructions

For Paper Setters: The question paper will consist of five sections A, B, C, D &E.
Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of thetotal marks of the semester end examination for the course.
For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non- programmable calculators is allowed.

SECTION-A

Linear dependence of vectors and rank of matrices, linear transformations and inverse of matrices, reduction to normal form, bilinear form and quadratic form, consistency and solution of linear algebraic system of equation, Eigen values, Eigen vectors and their applications to system of ordinary differential equations, Cayley Hamilton theorem, orthogonal, unitary, hermitian and similar matrices.

SECTION-B

Differential calculus of functions of several variables, partial differentiation, homogeneous functions and Euler's theorem, Taylor's and Maclaurin's series, Taylor's theorem for functions of two variables maxima and minima of functions of several variables, Langrange's method of multipliers.

SECTION-C

Double and triple integrals, change of order of integration, change of variables, applications to evaluation of area, surface area, and volume.

Scalar and vector fields differentiation of vectors, velocity and acceleration, vector differential operators Del, Gradient, Divergence and Curl and their physical interpretations, formulae involving these operators, line, surface and volume integrals, solenoidal and irrotational vecotors, Green's theorem, Gauss divergence theorem, Stoke's theorem and their applications.

SECTION-D

Formulation and classification of partial differential equations, solution of first order linear equations, standard forms of non- linear equations, Charpit's method, linear equations with constant coefficients, non- homogenous linear equations, Monge's method for non-homogenous equations of second order, separation of variables methods for solution for solution of heat, wave and Laplace equation.

Recommended Books

1. E Kreyszig,"Advanced Engineering Mathematics", 8th Ed. John Wiley, Singapore (2001)
2. R K Jain and S R K Iyengar, Advanced Engineering Mathematics", 2nd Ed, Narosa Publishing House, New Delhi (2003).
3. I A N Sneddon,"Elements of Partial Differential Equations", Tata McGraw Hill, Delhi (1974).
4. B S Grewal,"Higher Engineering Mathematics",Thirty –fifth edition, Khanna Publishers, Delhi.

Name of the Course	Principles of Engineering Economics		
Course Code	**HSMC – 3001**	**Credits: 2**	**L-2, T-1, P-0**
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max.Marks: 100**	**Min. Pass Marks:40**
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	**Max. Marks: 50**		

INSTRUCTIONS

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non- programmable calculators is allowed.

Section A

Introduction to Engineering Economics: Definitions, Nature and Scope of Economics; Difference between Microeconomics and Macroeconomics; Concepts of Engineering Economics- Engineering Efficiency and Economic Efficiency.

Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Section B

Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, Fluctuation of supply; Elasticity of supply and its measurement.

Section C

Theory of Production: Production Function, Factors of Production; Law of Variable Proportions; Law of returns to scale Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Section D

National Income: Circular Flow of Income, Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income -Production Method, Income Method, Expenditure Method.

Economic Stabilization: Monetary Policy- Meaning, Objectives, Tools; Fiscal Policy-Meaning, Objectives, Tools.

RECOMMENDED BOOKS

1. C S Park, "*Contemporary Engineering Economics*", Pearson Education, 2002.
2. J S Chandan, "*Statistics for Business and Economics*", Vikas Publishing.
3. H. L. Ahuja, "*Principles of Microeconomics*", S. Chand (G/L) & Company Ltd, 2002.
4. D. N. Dwivedi, "*Macroeconomics Theory and Policy*", Tata McGraw-Hill Publishing Company, 2010.
5. S Damodaran, "*Managerial Economics*", Oxford University Press, 2010.

Name of the Course	Analog Communication Laboratory			
Course Code	ECE-3051	Credits-1	L-0, T-0, P-2	
Lectures to be Delivered	39 hrs. (Lab Session=13(3 hrs. each))			
Semester End Examination	Max Marks: 50		Min Pass Marks: 20	Maximum Time: 3 hrs
Laboratory Continuous Assessment	Lab work 30%, Lab Record 25% Viva/Handson25%, attendance 20%		Max Marks: 50	Min Pass Marks: 25

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25 marks).

(ii) Viva-voce examination (25 marks)

Viva-voce examination will be related to the practical performed / project executed by the candidate related to the paper during the course of the semester.

1. To study Amplitude Modulation using a transistor and determine depth of modulation.
2. To study envelope detector for demodulation of AM signal and observe diagonal peak clippin effect.
3. Frequency Modulation using Voltage Controlled Oscillator.
4. Generation of DSB-SC signal using Balanced Modulator.
5. Generation of Single Side Band (SSB) signal.
6. Study of Phase Lock Loop (PLL) and detection of FM Signal using PLL.
7. Measurement of Noise Figure using a noise generator.
8. Study functioning of Super heterodyne AM Receiver.
9. Familiarization of PLL, measurement of lock/captures range, frequency demodulation, an frequency multiplier using PLL.
10. Measurement of Sensitivity, Selectivity and Fidelity of radio receivers.

Experimentation to be supported by computer simulations.

Name of the Course	Analog Electronics Laboratory			
Course Code	ECE-3052	Credits-1	L-0, T-0, P-2	
Lectures to be Delivered	39 hrs. (Lab Session=13(3 hrs. each))			
Semester End Examination	Max Marks: 50		Min Pass Marks: 20	Maximum Time: 3 hrs
Laboratory Continuous Assessment	Lab work 30%,LabRecord Viva/Handson25%,attendance		Max Marks: 50	Min Pass Marks: 25

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(iii) Performing a practical exercises assigned by the examiner (25marks).

(iv) Viva-voce examination (25marks)

Viva-voce examination will be related to the practical performed / project executed by the candidate related to the paper during the course of the semester.

List of Experiments:

1. To study the working of Hartley Oscillator and measure the frequency of oscillations
2. To study the working of Colpit's Oscillator and measure the frequency of oscillations
3. To study the functioning of Crystal Oscillator and measure the frequency of oscillations
4. To study the frequency response of two-stage RC coupled amplifier and find the voltage gain
5. To identify the type of feedback used in an amplifier and determine the voltage gain
6. To study the push-pull amplifier and plot the frequency response
7. To study the transformer coupled amplifier and determine the frequency response
8. To study the voltage gain and frequency response of FET amplifier

9. To study the astable, monostable and bistable multivibrators and their timing parameters.

Name of the Course	**Digital Electronic laboratory**			
Course Code	**ECE-3053**	**Credits-1**	**L-0, T-0, P-2**	
Lectures to be Delivered	**39 hrs. (Lab Session=13(3 hrs. each))**			
Semester End Examination	**Max Marks: 50**		**Min Pass Marks: 20**	**Maximum Time: 3 hrs**
Laboratory Continuous Assessment	**Lab work 30%,LabRecord Viva/Handson25%,attendance**		**Max Marks: 50**	**Min Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(v) Performing a practical exercises assigned by the examiner (25marks).

(vi) Viva-voce examination (25marks)

Viva-voce examination will be related to the practical performed / project executed by the candidate related to the paper during the course of the semester.

1. Design and verification of the truth tables of Half and Full adder circuits.
2. Design and verification of the truth tables of Half and Full subtractor circuits.
3. Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC7483.
4. Design and implementation of code converters using logic gates
   (i) BCD to excess-3 code
   (ii) Binary to gray code
5. Verification of the truth table of the Multiplexer using IC 74150.
6. Verification of the truth table of the De-Multiplexer using IC 74154.
7. Design and test of an SR flip-flop using NOR/NAND gates.
8. Verify the truth table of a D flip-flop (7474) and JK flip-flop (7476).
9. Design and implementation of 3-bit synchronous up/down counter.
10. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters using JK flip-flop.
11. Operate the counters 7490, 7493. Verify the frequency division at each stage and with a low frequency clock (say 1 Hz) display the count on LEDs.
12. Operate the universal shift register 74194.
13. Verify the truth table of decoder driver 7447/7448. Hence operate a 7 segment LED display through a counter using a low frequency clock.
14. Design and test D/A converter using R-2R Ladder Network

Detailed course contents of 4th semester

Course Code	**ECE-4001**	**Credits-3**	**L-3, T-1, P-0**
Name of the Course	**VLSI Technology**		
Lectures to be Delivered			
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

For Paper Setters: The question paper will consist of five sections A, B, C, D &E.
Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non- programmable calculators is allowed.

SECTION-A

Introduction to VLSI : Concept Miniaturization of Electronic Systems & its impact on characterization.

Monolithic Fabrication Techniques: Crystal growth: Source of silicon; Single crystalline and Poly crystalline; Requirement of purity for electronics industry; Electronics grade silicon production; Crystal growth techniques: Bridgeman method, Float zone method, Czocharalski method, Modified Czocharalski method; refining; Silicon Wafer Preparation & Crystal Defects.

Epitaxial Process: Need of epitaxial layer; vapors phase epitaxy -reactor design, Chemistry of epitaxial process, Transport mechanism doping & auto doping; selective epitaxy, Epitaxial process induced defects, Molecular beam epitaxy, Merits and demerits among epitaxial processes; recent trends in Epitaxy.

Oxidation: Importance of oxidation; types of oxidation techniques; growth mechanism & kinetics; factors affecting the growth mechanisms; silicon oxidation model, dry & wet oxidation; oxidation induced faults; recent trends in oxidation.

SECTION-B

Lithography: Basic steps in lithography; Lithography techniques-optical lithography, Electron beam lithography, X-ray lithography, Ion beam lithography; resists and mask preparation of respective lithographies, Printing techniques-contact, Proximity printing and projection printing; merits and demerits of lithographies; recent trends in lithography at nano regime.

Etching: Performance metrics of etching; types of etching- wet and dry etching; dry etching techniques-ion beam or ion-milling, Sputter ion plasma etching and reactive ion etching (RIE); merits and demerits of etching; etching induced defects; recent trends in epitaxy.

Diffusion and Ion Implantation: Diffusion mechanisms; diffusion reactor; diffusion profile; diffusion kinetics; parameters affecting diffusion profile; Dopants and their behavior, choice of dopants; Ion Implantation- reactor design, impurity distribution profile, Properties of ion implantation, Low energy and high energy ion implantation.

Metallization: Desired properties of metallization for VLSI; metallization choices; metallization techniques –vacuum evaporation, Sputtering.

SECTION-C

Packaging of VLSI Chip: Introduction to packaging; packaging process; package design considerations, Various packages types.

Isolation Techniques in Monolithic Components: Isolation techniques in Diodes, BJT and MOSFETs (Enhancement and depletion mode).

SECTION-D

Monolithic Components- Prototype Fabrication: Prototype fabrication of Diodes, npn BJT, pnp BJT, MOSFETs (Enhancement and depletion mode), n-MOS, p-MOS, CMOS, Resistors and Capacitors.

Recommended Books

1. S.M. Sze, "VLSI Technology", TMH
2. S.K. Gandhi, "VLSI Fabrication Principles", John Willey& Sons
3. Botkar, "Integrated Circuits", Khanna Publishers
4. G.T.A. Kovacs, "Micromachined transducer". McGraw Hill, 1998

Course Code	**ECE-4002**	**Credits-3**	**L-3, T-1, P-0**
Name of the Course	**linear Integrated Circuits**		
Lectures to be Delivered			
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

For Paper Setters: The question paper will consist of five sections A, B, C, D &E.
Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non- programmable calculators is allowed.

SECTION-A

Differential amplifiers: Introduction, Differential Amplifier configurations–Dual Input-Balanced output, Dual Input-Unbalanced output, Single Input-Balanced output, Single Input-Unbalanced output Differential amplifier with their DC and AC analysis, Differential amplifier using FET, Differential amplifier with swamping resistors, Constant current bias, Current mirror, Cascaded differential amplifier Stages, Level Translator, Cascode amplifier.

SECTION-B

Introduction to Op-amps: Block diagram of a typical Op-Amp, Schematic symbol, Characteristics and performance parameters of ideal Op-Amp, Open loop configurations: Differential, Inverting & Non Inverting. Practical Op-Amp: offset voltage analysis and compensation, input bias and offset current analysis and compensation, Change in Input offset voltage and Input offset current with time, Temperature and supply voltage, Common mode configuration and Common mode rejection Ratio, Frequency response, slew rate.

SECTION-C

Op-amp with Negative Feedback: Block diagram representation of feedback configurations, Voltage-series and Voltage–shunt feedback amplifier, Differential amplifiers-using one op-amp, two op-amps, three op-amps.

Op-amp Applications: DC and AC amplifiers, Peaking amplifiers, Summing, Scaling and Averaging amplifiers, Differential amplifier, Instrumentation amplifiers, V to I and I to V converters, Differentiator and integrator, A to D and D to A converters, Log and antilog amplifiers, Sample and hold circuits, Schmitt trigger.

SECTION-D

Active Filters and Oscillators: Active filters- Low-Pass, High-Pass, Band-Pass, Band-Reject Butterworth filters, State variable filters, All pass filters, Sallen and Key structures, Introduction to Chebyshev and Cauer Filters, phase-shift & Wein bridge Oscillators, Square wave, triangular wave and saw-tooth wave generators, Voltage controlled oscillator.

Specialised ICs: Phase Locked Loop- Operating principles and applications, Voltage Regulators - Fixed,adjustable and switching regulators, 555 Timer- its applications as Monostable and Astable multivibrators.

Recommended Books

1. Gayakwad Ramakant A., "Op-amps and Linear Integrated Circuits", 4th edition, Pearson Educatio Inc, Delhi, 2000.
2. Botkar K B, "Integrated Electronics", 10th edition, Khanna Publishers, 2005.
3. Sedra, Adel S and Smith, Kenneth C, "Microelectronic Circuits", 5th edition, Oxford Universit Press, 2005.
4. Roy Choudhary D and Jain Shail, "Linear Integrated Circuits", 3rd edition, New Age Internationa Publishers, 2007.
5. J. Michael Jacob, Applications and design with Analog Integrated Circuits", 2nd edition, PHI, 2004.

Course Code	**ECE-4003**	**Credits-3**	**L-3, T-1, P-0**
Name of the Course	Digital Communication and Systems		
Lectures to be Delivered			
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

For Paper Setters: The question paper will consist of five sections A, B, C, D &E.
Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of thetotal marks of the semester end examination for the course.
For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non- programmable calculators isallowed.

SECTION – A

Introduction: Concepts of Digitial Communication, Advantages/Disadvantages of Digital Communication Systems over Analog Communication Systems. Block Diagram of Basic Digital Communication Transmitter/Receiver.

Analog to Digital Conversion: Noisy Communications Channels, Sampling Theorem: Low Pass Signals And Band Pass Signals, Pulse Amplitude Modulation, Channel Bandwidth For PAM Signal, Natural Sampling, Flat Top Sampling, Signal Recovery & Holding, Quantization of Signal, Quantization Error, Pulse Code Modulation (PCM), Delta Modulation, Adaptive Delta Modulation.

SECTION – B

Digital Modulation Techniques: Binary Phase Shift Keying, Differential Phase Shift Keying, Differential Encoded PSK, QPSK, Quadrate Amplitude Shift Keying (QASK) Binary Frequency Shift Keying.

Data Transmission : Base Band Signal Receiver, Probability of Error, Optimum Filter, White Noise-Matched Filter, Probability of Error of The Matched Filter, Coherent Reception: Correlation, Application of Coherent Reception In PSK And FSK. Correlation Receiver for QPSK.

SECTION – C

Noise in Pulse Code & Delta Modulation Systems: PCM Transmission, Calculation of Quantization Noise, O/P Signal Power, The Effect of Thermal Noise, O/P Signal to Noise Ratio in PCM, Delta Modulation, Quantization Noise in Delta Modulation, The O/P Signal to Quantization Noise Ratio in Delta Modulation, O/P Signal to Noise Ratio in Delta Modulation.

SECTION – D

Information Coding and Decoding: Coding for Error Detection and Correction, Basics of Block Coding and Decoding, Introduction to Cyclic Codes, Basic Convolution Coding /Decoding and Viterbi Algorithm.

Recommended BOOKS

1. Tenebaum , A. Lanhgsam Y and Augensatein , A. J: Data structures using C , Prentice Hall of India.
2. Seymour Lipschutg : Theory an practice of Data structure , Mc. Graw Hill 1998. 3.Horowitz E and Sahni S: Data structure with Pascal 3rd edition , Galgotia 1991.

Course Code	**ECE-4004**	**Credits-3**	**L-3, T-1, P-0**
Name of the Course	**Communication Theory**		
Lectures to be Delivered			
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

For Paper Setters: The question paper will consist of five sections A, B, C, D &E.
Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of thetotal marks of the semester end examination for the course.
For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non- programmable calculators isallowed.

SECTION-A

Frequency and Time Domain Representation and Analysis: Introduction to Information, Messages & Signals, Classification of Signals., The Discrete and Continuous Spectrum, Power Spectrum, Energy Density Spectrum, Dirac Delta Functions, Sampling Theory and Approximations, Convolution of Signals, LTI Systems

SECTION-B

Random Signal Theory : Discrete Probability Theory, Continuous Random Variables, Statistically Independent Random Variables, Probability Density Functions of Sums, Transformation of Density Functions, Ergodic Process, Correlation Functions, Spectral Density and White Noise.

SECTION-C

Noise : Atmospheric, Thermal, Shot and Partition noise, Noise Figure and Experimental Determination of Noise Figure, Shot Noise In Temperature Limited Diode and Space Charge Limited Diodes, Pulse Response and Digital Noise.

Transmission Through Networks: Networks with Random Input, Auto-correlations, Spectral Density and Probability Density Input-output Relationships, Optimum System and Non-linear Systems, Maximum Criterion, Equivalent Noise Bandwidth.

SECTION-D

Basic Information Theory: Definition of Information, Units of Information, Entropy, Uncertainty and Information Rate of Communication, Redundancy, Relation Between System Capacity and Information Content of Messages, Shannon's Theorem, Discrete Noisy Channel, Channel Capacity for Different Discrete Channels.

Recommended Books

1. Elements of Communication Theory by J.C.Hancock, McGraw-Hill Education Publisher.

2. Principals of Communication System by Taub & Schilling, McGraw-Hill Education Publisher.

3. Communication Systems by S. Haykin, Wiley Publication.

Course Code	**ECE-4005**	**Credits-3**	**L-3, T-1, P-0**
Name of the Course	**Electromagnetic Field Theory**		
Lectures to be Delivered			
Semester End Examination	**Max Marks: 100**	**Min Pass Marks: 40**	**Maximum Time: 3 hrs**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			**Max Marks: 50**

Instructions

For Paper Setters: The question paper will consist of five sections A, B, C, D &E.
Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non- programmable calculators is allowed.

SECTION-A

Electrostatic and Magnetic Fields: Poisson's and Laplace's equations in various coordinate systems, Solution of single dimensional Laplace equation, conditions at a boundary between dielectrics, Electrostatic uniqueness theorem, Energy and mechanical forces in electric field, Method of Electrical images for a point charge in the neighborhood of infinite conducting plane, application of image method for transmission line capacitance calculations, Magnetic vector potential, Magnetic Scalar potential, Energy and mechanical forces in Magnetic fields

SECTION-B

Maxwell's equations: Equation of continuity for time varying fields, inconsistency of Ampere's law,Maxwell's equations and their physical interpretations, Maxwell's equations in Phasor form, conditions at a boundary surface
Electromagnetic Waves: TEM, Derivation of the wave equation and their general solution, plane wavesin unbounded media, wave propagation in lossless and conducting medium, penetration depth, reflection and refraction of plane waves, surface impedance.

SECTION-C

Poynting Vector and flow of power: Poynting's theorem, interpretation of (Ex H) vector, Instantaneous,Average and complex Poynting vector, Power loss in a plane conductor
Transmission Lines: Distributed parameters, Transmission Line Equations, Input impedance, Losslesspropagation, Line distortion and attenuation, line termination, impedance matching, standing wave ratio, Transmission Line charts (Smith Charts)

SECTION-D

Guided Waves and Wave Guides: Waves between parallel planes, Characteristics of TE and TM waves,Velocities of wave propagation, wave impedances, Introduction to wave guides, TE and TM waves in rectangular wave guides, Circular waveguides, Impossibility of TEM waves in wave guides, Wave impedances and characteristic impedances, Transmission line analogy for wave guides, Attenuation and Q-factor of wave guides

Recommended Books

1. Jordon E C and Balmain K G, "Electromagnetic waves and Radiating System", 2nd Ed., Prentice Hall, New Delhi (1993)
2. Carter G W, "The Electromagnetic Fields in its Engineering Aspects", Longmans, Green and Co., London (1954)
3. Hayt W H and Buck J A, "Engineering Electromagnetics", McGraw-Hill Education (India) Pvt. Ltd. (2006)
4. Wazed Miah M A, "Fundamentals of Electromagnetics", Tata McGraw-Hill, New Delhi (1982)
5. Raju G S N, "Electromagnetic Field Theory and Transmission Lines", Pearson (2006)

Name of the Course	Organizational Behavior		
Course Code	**HSMC – 4001**	**Credits: 2**	**L-2, T-1, P-0**
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max.Marks: 100**	**Min. Pass Marks:40**
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	**Max. Marks: 50**		

INSTRUCTIONS

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non- programmable calculators is allowed.

Section A

OVERVIEWOF MANAGEMENT: Definition - Management - Role of managers - Evolution of Management thought- Organization and the environmental factors – Trends and Challenges of Management in Global Scenario.

PLANNING: Nature and purpose of planning - Planning process - Types of plans – Objectives - - Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making

Section B

ORGANIZING: Nature and purpose of organizing - Organization structure - Formal and informal groups Organization - Line and Staff authority - Departmentation - Span of control- Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - - Performance Appraisal.

Section C

DIRECTING: Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories - Communication - Barriers to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity.

Section D

CONTROLLING: Process of controlling - Types of control - Budgetary and non-budgetary control Q techniques - Managing Productivity - Cost Control - Purchase Control – Maintenance Control - Quality Control - Planning operations.

Recommended Books:

1. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition.

2. Charles W L Hill, Steven L McShane, 'Principles of Management', McgrawHill Education, Special Indian Edition,2007.

3. Hellriegel, Slocum & Jackson, ' Management - A Competency Based Approach', Thomson South Western, 10th edition,2007.

Name of the Course	Circuit Design and simulation Lab			
Course Code	**ECE-4051**	**Credits-1**	**L-0, T-0, P-2**	
Lectures to be Delivered	**39 hrs. (Lab Session=13(3 hrs. each))**			
Semester End Examination	**Max Marks: 50**		**Min Pass Marks: 20**	**Maximum Time: 3 hrs**
Laboratory Continuous Assessment	**Lab work 30%,LabRecord Viva/Handson25%,attendance**		**Max Marks: 50**	**Min Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(i) Performing a practical exercises assigned by the examiner (25marks).

(ii) Viva-voce examination (25marks)

Viva-voce examination will be related to the practical performed / project executed by the candidate related to the paper during the course of the semester.

List of Experiments

1. Introduction to Tanner and Cadence EDA simulation tool.
2. To study the time and frequency response of series RLC circuit.
3. To study the frequency response of common emitter configuration of BJT.
4. To simulate N-MOS transistor and obtain its transfer and output characteristics.ss
5. To simulate-MOS transistor and obtain its transfer and output characteristics.
6. To simulate MOS inverter using resistive load, CMOS inverter, pseudo NMOS inverter and enhancement mode CMOS inverter and obtain their VTC.
7. To simulate NAND and NOR logic gate using CMOS and study its performance.
8. To simulate EX-OR and EX-NOR logic gate using CMOS and study its performance.
9. To simulate half adder and Full adder using CMOS and study its performance.
10. Introduction to Physical simulation and TCAD.
11. Build a simulation mesh for diode and study its characteristics.
12. Build a simulation mesh for BJT and study its characteristics.
13. Build a simulation mesh for MOSFET and study its characteristics.
14. To study the CMOS inverter characterization using proto-type fabricated NMOS and PMOS.

Note: The concerned Course Coordinator will prepare the actual list of experiments/problems at the start of semester based on above generic list.

Name of the Course	Linear integrated circuits Laboratory			
Course Code	**ECE-4052**	**Credits-1**	**L-0, T-0, P-2**	
Lectures to be Delivered	**39 hrs. (Lab Session=13(3 hrs. each))**			
Semester End Examination	**Max Marks: 50**		**Min Pass Marks: 20**	**Maximum Time: 3 hrs**
Laboratory Continuous Assessment	**Lab work 30%,LabRecord Viva/Handson25%,attendance**		**Max Marks: 50**	**Min Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

(iii) Performing a practical exercises assigned by the examiner (25marks).

(iv) Viva-voce examination (25marks)

Viva-voce examination will be related to the practical performed / project executed by the candidate related to the paper during the course of the semester.

List Of Experiments:

1. To experimentally study the performance of inverting, non-inverting and differential amplifier-using op-amp.
2. To experimentally study the performance of op-amp as summing, scaling and averaging amplifier.
3. To demonstrate working of an op-amp as a voltage level detector.
4. To demonstrate working of an op-amp as a square wave generator.
5. To demonstrate working of an op-amp as a triangular and saw-tooth wave generator.
6. To demonstrate working of an op-amp as Schmitt trigger.
7. To demonstrate working of an op-amp as a low pass filter.
8. To demonstrate working of an op-amp as a high pass filter.
9. To demonstrate working of an op-amp as an integrator.
10. To demonstrate working of an op-amp as a differentiator.
11. To demonstrate the operation of a 555 timer as monostable multivibrator.
12. To demonstrate the operation of a 555 timer as astable multivibrator.
13. To demonstrate the operation of VCO as Voltage to frequency characteristics of 566 IC.
14. To demonstrate the operation of PLL as Frequency multiplication using 565 IC.

Experimentation to be supported by computer simulations.

Name of the Course	Digital Communication and Systems Lab			
Course Code	**ECE-4053**	**Credits-1**	**L-0, T-0, P-2**	
Lectures to be Delivered	**39 hrs. (Lab Session=13(3 hrs. each))**			
Semester End Examination	**Max Marks: 50**		**Min Pass Marks: 20**	**Maximum Time: 3 hrs**
Laboratory Continuous Assessment	**Lab work 30%,LabRecord Viva/Handson25%,attendance**		**Max Marks: 50**	**Min Pass Marks: 25**

Instructions for paper setter / candidates

Laboratory examination will consist of two parts:

1. Performing a practical exercises assigned by the examiner (25marks).

2. Viva-voce examination (25marks)

Viva-voce examination will be related to the practical performed / project executed by the candidate related to the paper during the course of the semester.

List Of Experiments:

1. Time Division Multiplexing & Demultiplexing.
2. Pulse Code Modulation & Demodulation.
3. Delta Modulation and Demodulation.
4. Adaptive Delta Modulation and Demodulation.
5. Binary Phase Shift Keying (BPSK) Modulation and Demodulation.
6. Frequency Shift Keying (FSK) Modulation and Demodulation.
7. Amplitude Shift Keying (ASK) Modulation and Demodulation.
8. Quadrature Phase Shift Keying (QPSK) Modulation and Demodulation
9. To Study Characteristics of Gaussian Noise and to Measure its Spectral Height in Frequency Band over Which Its Spectral Density is flat.
10. To Study Line Coding Techniques.
11. To Study The Characteristics of The Phase Shifter, Multiplier and The Integrate-And-Dump Filter.