CURRICULUM

FOR

BACHELOR FOR TECHNOLGY IN "ELECTRONICS & COMMUNICATION ENGINEERING"

SRI SAI UNIVERSITY PALAMPUR (H.P.) INDIA

JULY 2012

CONTENTS

Foreword

Sri Sai University Palampur Himachal Pardesh has been established with a purpose of empowering people. The Vision and Mission of the university are:-

- **Vision**

To provide quality education for developing all round personality of students through curricular, co- curricular and extracurricular activities to meet ever growing manpower requirements of industry and other sectors of economy as per national priorities.

- **Mission**

a. To establish institutions for imparting quality education.
b. To promote creative and innovative research and development.
c. To ensure quality education by periodic review of curricula through industry- institute interaction.
d. To make efforts for updating knowledge of faculty/ staff through quality improvement programmes (Training and retraining)
e. To promote employability through development of requisite competency skills.
f. To work for cause of weaker sections, physically challenged and women welfare through education and enlightenment.
g. To make life healthier, better and modern by inculcating in students Indian values/ heritage.
h. To bring about out a holistic development of society by educating individuals.

At present programmes in Civil Engineering, Electrical Engineering, Mechanical Engineering, Electronics & Communication Engineering and Computer Science Engineering are being run here to develop manpower having global perspective, faith in our Indian values and culture and competencies desired for profession. In order to keep curriculum relevant and up to date, the University created a position of 'Director Curriculum Development' supported by Board of Studies of different discipline. The objective of this is to make teachers and students to become active partners in design of curriculum and instruction.

Director, Curriculum Development has involved Vice Chancellor, Executive Director and senior faculty members of SSU Palampur and Engineering & Technology Colleges at Pathankot and Amritsar in the revision of curriculum . This has created awareness and importance of systematic curriculum design seminar of various programmes and role expected from all the stake holders.

This curriculum has been designed by taking into account incorporating the existing programmes as being run at SSU Palampur and referring to courses of Punjab Technical University, Jalandhar; various IITs; VIT Vellore; Jamia Milia Islamabad New Delhi; PEC University of technology, Chandigarh and innovations undertaken by NITTTR Chandigarh in curriculum design. Hope this Curriculum will bring desired results.

Dr Naresh Nagpal
Executive Director
Sri Sai Group of Institutes
Corporate office, Chandigarh.

PREFACE

Curriculum is a plan comprising of learning experiences; to be given to students for developing competencies as desired by the 'world of work' in their professional life. Curriculum for SSU programmes has been designed with active involvement of the faculty and other stake holders. This process of designing the curriculum was a unique learning experience for all those involved in the process and understands the meaning and importance of scientific and systematic design of curriculum. A group of teachers provided feedback to the coordinator to up to date Curriculum. This group also scanned employment opportunities and job skills expected from an engineering graduate for inclusion in the curriculum, so as to make it relevant. This resulted in developing in the faculty a sense of ownership due to their involvement in the process.

The steps followed in the design of Curriculum of the degree programme were:

I. Discussions of Director, Curriculum Development with Chancellor, Vice Chancellor and Executive Director regarding their views on their Vision and Mission of the University vis a vis constraints of programme as well as expectations of Director, Curriculum Development.

II. Orientation programme for senior faculty of SSU to educate them about a rational approach to Curriculum design and to know about their experience of implementing the existing curriculum.

III. Interaction with the faculty from various Institutions to know their view point on their specific discipline, areas of employment, profile of an engineer and curriculum etc.

IV. Analyze the guidelines given by AICTE. ABET and NBA for programme accreditation so as to adhere to the norms and standards for Curriculum of Engineering Degree programmes.

V. Analysis of syllabus and test questions of engineering services examination to ensure that designed curriculum include most of the broad areas and their levels of expectations from fresh graduates.

VI. SSU faculty prepared Horizontal and Vertical organization of subjects of curriculum and learnt about taking decision on various components of Curriculum and their articulation and importance in terms of time. They also understood the logical and chronological placement of subjects in the whole Curriculum.

VII. A workshop was organized at SSCET Pathankot for having understanding of the common features of the programmes; present syllabus being followed at SSU, difference between PTU Curriculum and SSU curriculum and innovation possible in implementation of curriculum.

VIII. Feedback was collected from coordinators of SSU programmes on the aspects given in VII so as to incorporate these in Curriculum document.

IX. Obtain opinion of experts from industry and academic on the proposed curriculum for degree programme in different discipline of Engineering.

X. The curriculum documents were subsequently validated and finalized in consultation with SSU Faculty.

Curriculum provides requisite experiences to students through formal, nonformal and informal activities towards development of occupational, personal, social and continuing learning skills for making students employable. Focus of teachers and students is all the time to active the objective and outcome of the programme stated in the document. Students are made responsible for their learning and teachers become facilitators in this process.

During the design of the curriculum, the constraints of resources of the system in which this curriculum has to be implemented have been considered. It is hoped that with the support of enlightened administration and motivated faculty, innovative methodology will be adopted in teaching-learning process for providing desired learning experiences to the students as stated in curriculum documents.

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DIRECTOR, CURRICULUM DEVELOPMENT
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1. SALIENT FEATURES OF THE PROGRAMME

1. Name of the programme	:	B. Tech in Electronics and Communication Engineering
2. Duration of the programme:	:	4years
3. Entry Qualification	:	12+ Physics, Chemistry and Mathematics
4. Pattern of Programme	:	Semester system (8 Semesters)
5. Duration of the Semester	:	16 weeks
6. Total hours per week:	:	32 to 36 hours
7. Ecological and Environmental Awareness Camp and follow up	:	Second Semester (2-3) days
8. Entrepreneurship Development Camp and follow up	:	Fifth Semester (2-3)days
9. Industrial Training		*Workshop Practice of 4 weeks during summer vacation after second semester. It will also nclude Industrial exposure/tour also. • Industrial Training of Six weeks duration in summer vacation after fourth semester • Industrial Training of six months during seventh / eighth semester.
10. Student centered activity S.C.A will include	:	*library study/ independent study for searching and organization Information for use. • Library study • Market survey • Information search (industry/ in trust) • Seminar • Expert lectures • Camp for ecology & Environmental awareness, entrepreneurship development and personality development.

2. JOB OPPORTUNITY FOR B. TECH IN ELECTRONICS AND COMMUNICATION ENGINEERING

- **SCOPE FOR EMPLOYMENT**

Industries involving wireless communication and signal processing, micro and nano electronics lasers and optics, electronics devices, telecommunications, nanotechnology, robotics information systems, power systems, computer software-hardware integration, control systems and other advanced technologies.

Placement in leading core communication companies like BSNL, MTNL, Reliance communication, Tata telecom, Vodafone, Bharti telecom, Airtel, Nokia, CISCO, IBM, Intel ,Agilent, Alcatel, AT&T, Ericsson, Honeywell, Bosch, National Instruments, Texas Instruments, HCL, and others.

Employment in Government sector such as Railway, Defence, information and Broadcasting sector, space Research. A large number of employment opportunities

3. OUTCOME OF THE PROGRAMME

The Graduates of the ECE program:

- Will have a solid foundation in Electronics and communication engineering.
- Will have the analytical and practical skills to solve engineering problems along with competencies to apply knowledge in Mathematics and Science.
- Will have professional and communication skills to function as leaders and members of multi-disciplinary teams in engineering and other industries.
- Will have the capacity and motivation to function as ethically responsible professionals.
- Will be equipped to undertake lifelong learning.
- Will be prepared to ensure leadership role in addressing some of the technical issues of society.

4. STUDY AND EVALUATION SCHEME
(FIRST TO EIGHTH SEMESTER)

FIRST SEMESTER

Sr. No	Course Title	STUDY SCHEME			EVALUATION SCHEME		
		Hours/ Week			Marks		
		L	T	P	INT	EXT	TOTAL
1.1	Mathematics I	3	1	--	40	60	100
1.2	Basic Electrical engineering	3	1	--	40	60	100
1.3	Physics	3	1	--	40	60	100
1.4	Fundamentals of Computer programming and IT	3	0	--	40	60	100
1.5	Basic of Mechanical Engineering	3	1	0	40	60	100
1.6	Engineering Drawings and Graphics	1	0	6	40	60	100
1.7	Physics Laboratory	--	--	2	30	20	50
1.8	Basic Electrical Engineering laboratory	--	--	2	30	20	50
1.9	Fundamentals of Computer Programming and IT laboratory	--	--	2	30	20	50
1.10	Student Centered Activity	--	--	2			
	Total	**16**	**4**	**14**	**330**	**420**	**750**

SECOND SEMESTER

Sr. No	Course Title	STUDY SCHEME			EVALUATION SCHEME		
		Hours/ Week			Marks		
		L	T	P	INT	EXT	TOTAL
2.1	Mathematics II	3	1	--	40	60	100
2.2	Chemistry	3	1	--	40	60	100
2.3	Basic Electronics Engineering	3	1	--	40	60	100
2.4	Communication Skill	3	0	--	40	60	100
2.5	Basics of civil engineering	3	1	--	40	60	100
2.6	Workshop Practice/ manufacturing Practice	1	0	6	60	40	100
2.7	Chemistry Laboratory	--	--	2	30	20	50
2.8	Communication Laboratory	--	--	2	30	20	50
2.9	Electronics Engineering Laboratory	--	--	2	30	20	50
2.10	Student Centered Activity	--	--	2			
	Total	**16**	**4**	**14**	**350**	**400**	**750**

THIRD SEMESTER

Sr. No	Course Title	STUDY SCHEME			EVALUATION SCHEME		
		Hours/ Week			Marks		
		L	T	P	INT	EXT	TOTAL
3.1	Principle of Business, Economics and Management	3	1	--	40	60	100
3.2	Analog Electronics – 1(Electronic Devices & Circuits)	3	1	--	40	60	100
3.3	Digital Electronics	3	1	--	40	60	100
3.4	Electronic Measurements & Instrumentation	3	1	--	40	60	100
3.5	Microprocessor and its Peripherals	3	0	--	40	60	100
3.6	Network Analysis & Synthesis	3	1	--	40	60	100
3.7	Analog Electronics (Electronic Devices , Circuit) & Network Lab	--	--	2	30	20	50
3.8	Digital Electronics Labortoary	--	--	2	30	20	50
3.9	Electronic measurements and Instrumentation Lab	--	--	2	30	20	50
3.10	Microprocessor and its peripherals laboratory	--	--	2	30	20	50
3.11	Workshop Training marks	--	--		50		50
3.12	Student Centered Activity & seminar	--	--	2			
	Total	18	5	10	410	440	850

FOURTH SEMESTER

Sr. No	Course Title	STUDY SCHEME			EVALUATION SCHEME		
		Hours/ Week			Marks		
		L	T	P	INT	EXT	TOTAL
4.1	Analog Communication System	3	1	--	40	60	100
4.2	Analog Electronics -II (Electronic Devices & Circuits)	3	1	--	40	60	100
4.3	Electromagnetic field theory	3	1	--	40	60	100
4.4	Linear Integrated Circuits and Control System	3	1	--	40	60	100
4.5	Signals & System	4	1	--	40	60	100
4.6	Numerical & statistical Methods	3	1	--	40	60	100
4.7	Analog Communication Laboratory	--	--	2	30	20	50
4.8	Linear integrated circuit Laboratory	--	--	2	30	20	50
4.9	Analog Electronics Laboratory	--	--	2	30	20	50
4.10	Student Centered Activity	--	--	2			
	Total	**19**	**6**	**8**	**330**	**420**	**750**

FIFTH SEMESTER

Sr. No	Subject Title	STUDY SCHEME			EVALUATION SCHEME		
		Hours/ Week			Marks		
		L	T	P	INT	EXT	TOTAL
5.1	Linear Control System	3	1	--	40	60	100
5.2	Object Oriented Programming using C++	3	1	--	40	60	100
5.3	Antenna and wave propagation	3	1	--	40	60	100
5.4	Pulse, Digital and switching circuits	3	1	--	40	60	100
5.5	Digital Communication system	3	1	--	40	60	100
5.6	Elective I	3	1	--	40	60	100
5.7	Linear Control System Lab	--	--	2	30	20	50
5.8	Object Oriented Programming using C++ laboratory	--	--	2	30	20	50
5.9	Digital Communication System Lab	--	--	2	30	20	50
5.10	Industrial Training marks	--	--		40	60	100
5.11	Student centered Activity	--	--	2			
	Total	**18**	**6**	**8**	**370**	**480**	**850**

ELECTIVE I

- Bio Medical Electronics
- Image Processing
- Satellite Communication

SIXTH SEMESTER

Sr No	Subject Title	STUDY SCHEME			EVALUATION SCHEME		
		Hours/ Week			Marks		
		L	T	P	INT	EXT	TOTAL
6.1	Computer Organization & Architecture	3	1	--	40	60	100
6.2	Digital Signal Processing	3	1	--	40	60	100
6.3	Microcontrollers & Embedded System	3	1	--	40	60	100
6.4	Microwave Radar and Engineering	3	1	--	40	60	100
6.5	Computer Networks	3	1	--	40	60	100
6.6	Industrial electronics	3	1	--	40	60	100
6.7	Digital signal processing using MAT LAB	--	--	2	30	20	50
6.8	Microwave Radar and Engineering Laboratory	--	--	2	30	20	50
6.9	Micro Controller & Embedded System Laboratory	--	--	2	30	20	50
6.10	Industrial Electronics Laboratory	--	--	2	30	20	50
6.11	Student centered Activity	--	--	2			
	Total	**18**	**6**	**10**	**360**	**440**	**800**

7th/8th Semester				
	COURSE TITLE	Marks		
		INT	EXT	Total
	(a)Industrial training with	300	200	500
	(b) Software Training (Electronic CAD,MATLAB) (sixth months)	150	100	250
	TOTAL	450	300	750

SEVENTH/ EIGHTH SEMESTER

Sr.No	Course Title	STUDY SCHEME			EVALUATION SCHEME		
		Hours/ Week			Marks		
		L	T	P	INT	EXT	TOTAL
8.1	Wireless Communication	3	1	--	40	60	100
8.2	Optical Fiber Communication	3	1	--	40	60	100
8.3	VLSI Design and technology	3	1	--	40	60	100
8.4	Elective II	3	1	--	40	60	100
8.5	Total Quality Management	3	1	--	40	60	100
8.6	VLSI Lab	--	--	2	30	20	50
8.7	Major Project	--	--	6	120	80	200
8.8	General Fitness	--	--		100		100
8.9	Student centered Activity	--	--	2			
	Total	**15**	**5**	**10**	**450**	**400**	**850**

ELECTIVE II

- Television Engineering
- Cellular Mobile Communication
- Database Management system
- Neural Network and Fuzzy logic

5. DETAILED CONTENT OF VARIOUS SUBJECTS

A. FIRST SEMESTER

1.1 MATHEMATICS-I

MODULE-I

Infinite series: Convergence and divergence of infinite series, geometric series test, comparison tests, p-test, ratio test, root test, Raabe's test, Logarithmic test, Gauss test, Alternating series, power series, radius of convergence, interval of convergence

Differential calculus: Partial derivatives, Homogeneous function, Euler theorem, chain rule, change of variables, Partial differentiation of implicit function, Taylor series of two variables, Maximum and Minimum values of function of two variables, Jacobin, Error and increment .curve tracing.

MODULE-II

Solid Geometry: Sphere, tangent plane, orthogonality, Cone, Cylinder, Quadratic surfaces.

Integral calculus: Rectification, quadrature, volume, Surface area of solid of revolution, double and triple integral, order of integration, change of variables, Application of double and triple integral. beta and gamma function.

MODULE-III

Vector calculus:Differentiation of vector, velocity,acceleration, Scalar and vector field, Gradient of scalar field and directional derivatives, Divergence, Curl of vector field, Physical significance, Integration of vector, Line , surface ,volume integral, Stokes theorem, Divergence theorem, green's theorem

Text Books

1. *Advanced Engg.Mathematics ,R.K.Jain,S.R.K.Iyengar Narosa publication*
2. *Higher Engg.Mathematics,B.S.Grewal,Khann publication*
3. *Higher Engg.Mathematics,N.P.Bali,Laxmi Publication*
4. *Advanced Engg.Mathematics,kreyszig,john wiley and sons*

1.2 BASIC ELECTRICAL ENGINEERING

Introduction: Basic electrical quantities, Electric circuit sources and circuit elements and their behavior (Active and passive).

Supply Systems: AC Supply system (Single phase, three phase–three wire, Three phase–four wire), DC supply system, Their specifications and Comparison. D.C. Networks: Mesh and Nodal Analysis, Star–Delta Transformation, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Step voltage response of RL and RC series circuits.

Sinusoidal Steady-State Response of Circuits: Concept of Phasors, Phasor representation of circuit elements, Complex notation representation, Series and parallel circuits, Power and power factors, Resonance in series and parallel circuits, Balanced 3–phase voltage, Current and power relations, 3–phase power measurement.

Magnetic Circuits: Concept of Magnetic circuits, B–H curve, Calculation of Magnetic Circuits, Iron Losses.

Single–Phase Transformers: Constructional feature, EMF equation, Ideal transformer, Open and short circuit tests, Voltage regulation and efficiency.

Rotating Electrical Machines: Construction, Operating principles and Applications of DC generator, DC motor, Three phase Induction motor and Single phase induction motors.

Measuring Instruments: Voltmeter, Ammeter, Wattmeter, Energy meter.

Batteries: Storage batteries:- Types, construction, charging and discharging, capacity and efficiency ***Text books:-***

1. *Smith, I.M., Hiley, J. and Brown, K., Electrical and Electronic Technology, Dorling Kingsley.*
1. *Nagrath, I.J. and Kothari, D.P., Basic Electrical Engineering, TMH*
2. *Naidu, M.S. and Kamashaiah, S., Introduction to Electrical Engineering, TMH*
3. B.L. Theraja & A.K. Theraja, S.Chand: Electrical Technology(Vol-1).

Reference Books:-

1.Chakrabarti, A., Basic Electrical Engineering, TMH

2.Del Toro, V., Electrical Engineering FundamentalsPHI

3. Sawhney A. K . "A Course in electrical and electronic Measurements & Instumentation" Dhanpat Rai & co

1.3 PHYSICS

MODULE – I

L**ASER:-**Basic concept of Laser, maser, principle of Laser action Population Conversion pumping its types its types. Types of Laser, Solid, gas and , Semiconductor and its application. Holography & its applications.

Optical Fibers:-Basic Principle of Optical fibre, characteristic of Optical fibre. Numerical aperture, graded Index, Step Index, its relation with Δ, propagation of light in Optical fibre. energy loss during propagations (dispersion), optical communication, through free space, wave guide, its applications.

MODULE – II

Special Theory of relativity: Postulates of special theory of relativity, Michelson Morley Experiment, Lerentz Transformation, Length Contraction, Time dilation, addition velocity Relativity of mass Energy equivalence.

Quantum Mechanics: Need of quantum Mechanics**,** De brogile wave phase & group velocity, particle diffraction uncertainty principle, the wave equation, postulates of Quantum mechanics. Time dependent and independent schrodinqer equation, Expectation values, Eigen value, eigen function, particle in a one dimensional box Finite potential well, Harmonic oscillator.

Quantum Statistics: Fermions & Bosons Symmetric & antisymmetric wave functions, Boltzman distribution functions, Base distribution & Fermi distributions function, Comparison of the distributions, Applications of base distribution function specific heat of solid Base-Condensation, Applications of Fermi-distribution functions, Free Electron gas thermionic emission.

MODULE – III

Superconductivity & Magnetism: Basic concept of superconductor, Meissner effect, type I & II superconductors, London equation, BSC Theory, Thermodynamic properties of superconductor Josephson Effect, flux equatization squid, orbital magnetic dipole moments orbital g-factor, magnetic dipole in uniform magnetic field, Electron spin magnetic properties of solid, diamagnetic Theory of para magnetic, susceptibility, Ferro magnetic, Antiferro Magnetic & Ferrimagnetism.

Electro Magnetism: Quantization & conservation of charge, Coulomb's Law, concept of Electric flux, Electric potential conductors, Capacitors, & dielectric materials, magnetic field, Force on a moving charge in a magnetic field, force on current Element, torqueon current Loop, Biot Savart Law, Amphere's Law, Electromagnetic Induction & Faradays Law, Magnetism in materials Maxwell equations, Divergence, gradient & Curl and Significance.

Text Books:-

1. *Beiser, A., Concept of Modern Physics, TMH*
2. *Griffiths, D.J., Introduction to Electrodynamics, PHI*
3. *Kittel, C., Introduction to Solid State Physics, Wiley,*
4. *Thyagarajan K & A K Ghatak, Lasers, , Macmillan India Ltd. Banglore.*
5. *Gerd Keiser Optical Fibre Communication, TMH*
6. *Arora C.L. Practical Physics, S. Chand & Co.*

Reference Books:-

1. *Rao, C.K, Optical Fibre System, Mc Graw Hill.*
2. *Sirohi R.S., Practical Physics, R.S. Sirohi, Wiley Eastern.*
3. *Modern Phusics, H.C.Ohanian, Prentice Hall.*

1.4 FUNDAMENTAL OF COMPUTER PROGRAMMING & IT

Introduction: Elements of computer processing, Hardware and software, Introduction and feature wise comparison of various Operating Systems, Including DOS, Windows and Linux, Problem solving-algorithms and flowcharts.

C Programming Basics: Basic program construction, Structure of a C program, Compilation process. Various compilers available on different OS/ environments including Turbo C, Borland C, gc, gcc, MSVC. Console I/O (printf, scanf), preprocessor directives, Comments, Data types, Type conversions, Operators - arithmetic, Relational, Logical, Conditional, Increment/decrement, Library functions, Header files.

Loops and Decision Statements: *for* loop, *while* loop, *do* loop, Various forms of *if* statement, *switch* statement, *break* statement, *continue* statement, *goto* statement, arrays and strings, Declaring an array, Initializing arrays, Accessing the array elements, Working with multidimensional arrays, Declaring and initializing string variables, Arithmetic operations on characters, String handling functions (string.h), Pointers, Pointers to pointers, Declaring and initializing pointers, Pointer expressions, Pointer increment and scale factor, Pointers and arrays, Pointers and strings.

Functions: Defining functions, Passing arguments to functions, Returning values from functions, Reference arguments, Variables and storage classes, Static functions, Pointers and functions.

Structures and Union: Declaring and initializing a structure, Accessing the members of a structure, Nested structures, Array of structures, Using structures in functions, Pointers and structures, Declaring and initializing a union.

Files: Reading and writing to text and binary files, Character I/O, String I/O, File pointers, Error handling, Redirection, Command line arguments.

Structured Programming vs. Object Oriented Programming.

Text Books

1. *KernighanBrian W. and Ritchie, Dennis M, The C Programming language, Dorling Kingsley(2008) 2nd ed.*
2. *Balagurusamy, E., Programming in Ansi C, TMH.*

Reference Books

1. *Stroustrup, Bjarne, The C++ Programming Language,. Addison Wesley*
2. *Kanetkar, Yashavant, Let Us C, BPB*

1.5 BASICS OF MECHANICAL ENGINEERING

First Law of Thermodynamics: Essence and corollaries of the first law, analytical expressions applicable to a process and cycle, internal energy, enthalpy and specific heats, first law analysis of steady flow, applications of steady flow energy equation to engineering devices.

Applications of first law of Thermodynamics: Closed and open systems, analysis of non-flow and flow processes for an ideal gas under constant volume (Isochoric), constant pressure (Isobaric), constant temperature (Isothermal), adiabatic and polytropic conditions. Analysis of free expansion and throttling processes. Representation of these processes on P-V charts and analysis of property changes and energy exchange (work and heat) during these processes.

Second Law of Thermodynamics: Limitations of first law, various statements of second law and their equivalence, application of statements of second law to heat engine, heat pump and refrigerator. Philosophy of Carnot cycle and its consequences. Carnot theorem for heat engines and heat pump. Classius inequality, concept and philosophy of entropy and entropy changes during various processes. Temperature – entropy chart and representation of various processes on it. Third law of thermodynamics.

Simple Stresses & Strains: Concept & types of Stresses and strains, Poisson's ratio, stresses and strain in simple and compound bars under axial loading, stress strain diagrams, Hooks law, Elastic constants and their relationships. Temperature stress and strain in simple and compound bars under axial loading, Numerical problems.

Shear Force and Bending Moments Definitions, SF & BM diagrams for cantilevers, simply supported beams with or without over-hang and calculation of maximum BM and SF and the point of contraflexture under (i) concentrated loads, (ii) uniformly distributed loads over whole span or a part of it, (iii) combination of concentrated loads and uniformly distributed loads. Relation between the rate of loading, the shear force and the bending moments, Numerical Problems.

Bending Stresses in Beams: Bending Stresses in Beams with derivation of Bending equation and its application to beams of circular, rectangular I & T Section, Composite beams,

Torsion of Circular members: Torsion of Solid and hollow circular shafts, Combined bending and torsion, Equivalent torque, Numerical Problems.

Text Books:-

1. *Nag, P.K., "Engineering Thermodynamics", Tata McGraw – Hill, New Delhi.*
2. *Yadav, R., Thermal Science and Engineering, Central Publishing House, Allahabad.*
3. *G.H.Ryder "Strength of Materials" Macmillan India.*
4. *Mechanics of Materials – Dr. Kirpal Singh, Standard Publishers Distributors, New Delhi.*

Reference Books

1. *Popoy , "Strength of Materials", PHI,*
2. *Sadhu Singh, "Strength of Materials" , Khanna Publications.*
3. *Strength of Materials – A Rudimentary Approach – M.A.Jayaram, , Sapna Book House,*

1.6 ENGINEERING DRAWING AND GRAPHICS

Introduction: Use of drafting tools, Lettering, Dimensions and Standards, Line Conventions.

Projection Systems: Projection Planes, Projection systems, Orthographic projections of points in first angle projection system and third angle projection system, Orthographic projections of lines on reference planes, True length of line using rotation of view method, Traces of lines, Auxiliary planes and their applications, Projections of Lamina parallel/inclined to reference planes, Projection of solids- Polyhedra, Solids of revolution, Sections of solids- Section plane parallel / inclined to reference planes, Intersection of solids.

Development of Surfaces: Development of surfaces like Prism, Pyramid, Cylinder, Cone, Sphere etc. using Parallel Line Method, Radial Line Method, Triangulation method.

Orthographic Projections: Extracting Orthographic projections from given pictorial views.

Isometric Views: Extracting Isometric projections from given Orthographic views using box method, Offset method.

Missing Lines and Missing Views: Evaluating missing lines and missing views from given orthographic views.

Computer Aided Drafting: Introduction to computer drafting tools like AutoCAD. Demonstration of commands like Line, Circle, Arc, Rectangle, MText and Dimensioning etc.

Text Books:-

1. *Gill, P.S., Engineering Drawing - Geometrical Drawings, S.K. Kataria*
2. *Mohan, K.R., Engineering Graphics, Dhanpat Rai Publishing Company*

Reference Books

1. *French, Thomas E., Vierck, C. J. and Foster, R. J., Fundamental of Engineering Drawing & Graphics Technology, McGraw Hill Book Company*
2. *Bhatt, N.D. and Panchal, V.M., Engineering Drawing: Plane and Solid Geometry, Charotar Publishing House*

1.7 PHYSICS LABORATORY

LABORATORY WORK

List of Experiments

1. To find the frequency of A.C. mains using Electric Vibrator.
2. To determine the resistivity & Hall coefficient of a Semi Conductor by four probe method at different temperature.
3. To study the variation of magnetic field of a circular coil Carrying current I & Calculate the radius of coil.
4. To study the divergence of a Laser beam.
5. To determine the wave length of Laser using diffraction grating.
6. Determine the numerical aperture of an optical fibre.
7. To determine attenuation and propagation Lasses in optical fibre.
8. Making up the hologram using advanced Laser hit.
9. To find the susceptibility of ferro magnetic material (Fecl3) by quince Method.
10. To study Laser interference using Michelson Morley Interferometer
11. To study the photovoltaic cell & hence to verify the inverse square law.
12. To convert a galvanometer into an ammeter of a given range.
13. To find the value of plank's constant by using a photo electric cell.
14. To find the Low resistance by Carry Foster's Bridge.

1.8 BASIC ELECTRICAL LABORTOARY

List of Experiments

1. To verify KCL and KVL.

2. TO study frequency response of series RLC circuit and determine resonance frequency and factor for various values of R,L,C

3. TO study frequency response of parallel RLC circuit and determine resonance frequency and factor for various values of R,L,C

4. To perform direct load test of transformer and plot efficiency v/s load characteristics.

5. To perform direct load test of the DC shunt generator and plot load v/s current curve.

6. To study and verify Thevenins, Norton's, superposition, Milliman's, maximum power, reciprocity theorems .

7. To perform O.C and S.C test of transformer.

8. to study various types of meters

9. Measurement of power by 3 voltmeter/ 3 ammeter method.

10. Measurement of power in 3-phase system by 2-wattmeter

1.9 FUNDAMENTALS OF COMPUTER PROGRAMMING & IT LABORTAORY

LABORATORY WORK

Introduction to Hardware - CPU, Storage devices & media, VDU, I/O Devices.Basic Operating System (DOS/UNIX) commands. Simple programs to demonstrate the use of constants, Variables, printf, scanf and operators. Programs using Loops: Solution of quadratic equation, Summation of finite series, Fibonacci series, Prime numbers, Factorial. Menu driven programs using switch statement. Use of continue and break statements, Conditional operators. Passing variables to functions by values and by reference, Number conversion using array, Sorting, Merging, Arithmetic operations on matrices. String manipulation: Comparing, Copying, Reversing , Finding length, Extracting characters. Simple programs demonstrating the concept of Pointers, Passing values to functions using pointers for arrays, Structures. Creating various types of records using structures. Storing and retrieving records from a file, Copying a data file. Randomly accessing a record, Use of command line arguments.

B. SECOND SEMESTER

2.1 MATHMETICS-II

MODULE-I

Linear Algebra: Rank, Linear Independent and Dependent, system of liner equations, Eigen values and Eigen vector, Cayley Hamilton theorem, diagonalization, linear transformation, quadratic form and Reduction to canonical form. Complex matrices.

Complex Numbers: De-Movire's theorem and its application, Elementary function of complex variable, Summation of series.

MODULE-II

Function Of Complex Variable: Analytic function, Harmonic functions, Necessary and sufficient condition for the function w= f(z) to be analytic, Application of analytic function in flow problem, complex integrations, Cauchy's integral theorem, Cauchy's integral formula, Cauchy's integral formula for derivatives, Power series, Taylor's and Laurent's series, Zero's & singularities of complex function, Evaluation of real integral using residues, Bilinear transformation and conformal mapping

MODULE-III

Ordinary Differential Equation: Formation of differential equation, Exact differential equation, equation of first order and higher degree equation, Claurit's equation, Linear differential equation , Bernoulli's equation, Linear differential equation with constant coefficient, Method of variation of parameter, Method of undetermined coefficient, Cauchy and Legendre equation , simultaneous differential equation, application of linear differential equation.

Partial Differential Equations And Its Applications: Formation of P.D.E , Lagrange equations, Charpit method, Higher order linear differential equation with constant coefficient.

Text books:-

1. *Simmons, G.F., Differential Equations (With Applications and Historical Notes ,TMH*
2. *Jain,.R.K, .Iyengar "Advanced Engg.Mathematics" , Narosa publication*
3. *Grewal B.S,"Higher Engg.Mathematics",.,Khanna publication*
4. *Kasana, H.S., Complex Variables: Theory and Applications, PHI*

Reference Books:-

1. *Kreyszig Erwin, Advanced Engineering Mathematics, John Wiley (2006*
2. *Ram Babu, Engineering Mathematics, Pearson Education (2009).*
3. *Higher Engg.Mathematics,N.P.Bali,Laxmi Publication*
4. *Advanced Engg.Mathematics,kreyszig,john wiley and sons*

2.2 CHEMISTRY

MODULE I

BASIC CONCEPTS AND WATER TECHNOLOGY: Atomic number, valency, molecular weight, equivalent weight ,morality, normality, how to write a molecular formula.

Water: Structure of water, water as solvent, characteristic properties of water Sources of water, Specifications for water, BOD, COD and DO, Hardness and its determination (EDTA method only), Sewage treatment, Purification of municipal water, Water softening processes – Lime – Soda process, Ion exchange method, boiler feed water, boiler problems-scale, sludge, priming and foaming, caustic mbitterment and boiler corrosion, their causes and prevention, carbonate and phosphate conditioning, colloidal conditioning, calgon treatment, Desalination of water: Reverse osmosis, electro dialysis and multiple effect evaporation. Numerical problems of hardness and Lime-Soda process (7 Hours)

CORROSION SCIENCE: Definition, cause, types and mechanism of corrosion, factors influencing corrosion protective measures against corrosion, metal finishing like electroplating of Au and Cr and electrolessplating of Ni on Al and also preparation of printed circuit board by electrolessplating. (7 Hours)

NON- METALLIC ENGINEERING MATERIALS : (i) Cement : Chemical constitution of Portland cement, functions of different constituents. Theories of the setting of cement. (ii) Abrasives : Introduction, types of abrasives and applications. (7 Hours)

MODULE II

PHOTOCHEMISTRY: Difference between thermo chemical and photochemical rxn., Lambert and beer laws , quantum yield, classification of photochemical rxn, kinetics of some photochemical rxn, Jablonski' s diagram, mechanism of photosensitization, LASER and MASER 7 Hours)

FUELS AND LUBRICANTS : Fuels: Definition, characteristics of good fuel, calorific value: gross and net calorific values and their determination by bomb calorimeter, , Classification of fuels: primary and secondary fuels (7 Hours)

Lubricants: Introduction, friction and wear, Lubricants, mechanism of Lubrications, base oils, additives, greases and emulsions Lubricants :Types of lubrication, fluid film lubrication, boundary lubrication and extreme pressure lubrication. Function of lubricants .Classification of lubricants, solid, semisolid, liquid, emulsions, synthetic lubricants. Conditions for using different types of lubricants. Properties of lubricants.

(7Hours)

MODULE III

Liquid Crystal: Classification of liquid crystals, chemical constitution and liquid crystalline behavior in PAA and MBBA, liquid crystal homologous series, molecular ordering in nematic, smectic and columnar type liquid crystals, identification of liquid crystals using optical microscopy, electro optic properties of liquid crystals, polymorphism in thermotropic liquid crystal and application of liquid crystals(7 Hours)

High Poymers: Definition, classification of polymers, types of polymerization, methods of polymerization, glass transition temp., structure of polymers, plastics, synthesis, properties and applications of few commercial thermoplastic and thermosetting polymers, techniques of plastic moulding, elastomers, adhesive, compounding of resins and plastics, conducting polymers and conduction mechanism in polyacetylene(7 Hours)

Nano-materials: Introduction to nano-materials, Graphite, fullerenes, carbon nanotubes, nanowires, nanocones, Haeckelites. Their electronic and mechanical properties .. Production methods for CNTS. .. Applications of nano materials in i) Medicine ii) Catalysis iii) Environmental Technologies iv) Electronics v) echanics. (5 Hours)

Text Books:-

1. *Shashi Chawla "Engg. Chemistry"*
2. *Vasant Gowarikar "Polymer Chemistry"*
3. *Bandyopadhyay A.K., "Nano Materials" ,New age International Publisher*
4. *Palanna "Engg. Chemistry" TMH*

Reference Books:-

1. *Misra, G.S., Introductory Polymer Chemistry, New Age International (1993).*

2.3 BASIC ELECTRONICS ENGINEERING

Semiconductor Physics: Brief review of Band Theory, concept of conductor, semiconductor and insulator. transport phenomenon in semiconductors, concept of intrinsic and extrinsic semiconductor, Donor and acceptor Impurities, charge densities in semiconductor.

Introduction to Electronic Components and PCB manufacturing : Active and Passive elements, working of common electronic components like resistors, capacitors, inductors component testing and their application in circuits. PCB designing and assembling techniques.

Semiconductor DIODE:- PN Junction, Reverse and Forward bias conditions, Diode Characteristic and parameter, Ideal vs. Practical diode. equivalent circuits . rectification-half and full wave & filters(shunt capacitor ,series inductor & LC). Types of Diodes:- Zener Diode and its applications, photodiode,LED , Tunnel Diode, Varactor Diode, schotkey diode.

Bipolar Junction Transistor:- construction of pnp & npn transistors, transistor configurations (cb,ce,cc), input and output characterstics.

Unipolar Junction transistor:- FETS,MOSFETS and their VI characterstics

Electronic instruments- Role and importance of digital multimeter and CRO,measurement of amplitude frequency and phase using CRO.

Text books:-

1. A.P.Malvino.Electronic Principles.

2. J.D. Ryder Electronic Fundamentals and Applications.

3.*electronic devices and circuits by JB Gupta- Kataria and sons publications*

4.Electronic Principles by "Sahdev"- Dhanpat Rai and sons Publication.

Reference Books:-

1 *Sawhney A. K . "A Course in electrical and electronic Measurements & Instumentation" Dhanpat Rai & co*
2 *Millman and C.C.Halkias Electronic Circuits & Devices.*
3 *J.Millman & C.C.Halkias Integrated Circuits & Devices.*
4 *N.N.Bhargava & Kulshrestha, Electronic Devices.*

2.4 COMMUNICATION SKILLS

MODULE-I

The Process of Communication: Concept and process of communication; Barriers to Communication; Different Types of Communication; Written vs. Oral Communication; Different Types of Face-to-Face Interactions; Characteristics and Conventions of Conversation; Difference between Conversation and Other Speech Events;

Telephone Techniques: Warm Up; Speaking and Listening: Commonly Used Phrases in Telephone Conversations; Reading: Conference Calls; Vocabulary; Writing and Listening: Leaving a Message; Grammar and Usage- The Perfect Tenses; Pronunciation- Contracted Forms.

Job Applications and Interviews: Curriculum Vitae; Language Focus; Some Useful Words; Preparing for an Interview; Listening and speaking in the interview.

MODULE-II

Group Discussions: How to be Successful in a Group Discussion; Study Skills ; Language Focus; Speaking; Case discussions.

Managing Organisational Structure: The Role of a Manager; Leadership; Language Focus; Writing Reports; Pronunciation.

Meetings: A Successful Meeting; Speaking: One to One Meetings; Language Focus: Opening, Middle and Close; Editing; Criteria for Successful Meetings; Reporting Verbs; Memos

MODULE-III

Taking Notes and Preparing Minutes: Taking Notes- The Essential Components, Preparing Minutes- Format of Minutes, Language and Style of Minutes, Grammer.

Presentation Skills : Presentation Skills; Importance of Body Language in Presentations; pronunciation; Structure of presentation; Visual Aids; Ending the presentation; Podium Panic Pronunciation: Emphasizing the Important Words in Context

Negotiation Skills: Idiomatic Expressions; Process of Negotiations; Phrasal Verbs; Listening: Effective Negotiations; Speaking; Writing.

Technical Report Writing: Objective; Planning; Language; format of the report and guidelines for a good report writing with illustrations of good writing.

Practice Sessions: Students should be asked to prepare and present seminars during the practice session. Group discussions and case discussions should also be used and feedback given to students.

Reference Books:-

1. *The Chicago Manual of Style, PHI*
2. *Gowers, Ernest, "The Complete Words". Penguin, 1973.*
3. *IEEE Transactions on "Written and Oral Communications" has many papers of relevance*
4. *Ludlow, R., and Panton, F., "The Essence of Effective Communication", PHI*

2.5 BASIC CIVIL ENGINEERING

1. **Introduction to Civil Engineering :**

Introduction, branches of civil engineering, application of civil engineering in other allied fields.

2. **Building Planning :**

Principles of planning, orientation of buildings, introduction to Bye-Laws regarding building line, height of building, open space requirements, F.S.I., setbacks, ventilation, sanitation as per municipal corporation area requirement.

3. **Components of Buildings :**

• Sub-structure

Types of soil and rocks as foundation strata, concept of bearing capacity, types of foundations i.e. shallow and deep and their suitability. Shallow foundation such as wall foundation, isolated foundation, deep foundation such as pile foundation.

• Super-structure

Elements of super-structures and their functions

4. **Building Design :**

Introduction to types of loads, concepts of strength, stability, durability and factor of safety of building, load bearing and framed structures.

5. **Building Materials :**

Use and properties of the following materials :

• Concrete – ingredients and grades, plain and reinforced cement concrete and ready mix concrete, bricks, steel, aluminum, plastic, timber, roofing materials etc.

6. **Surveying :**

• Principles of surveying

• Classification of surveys

• Chain Surveying

Introduction to metric chain and tapes, error in chaining, nominal scale and R.F., ranging, chaining and offsetting, index plan, location sketch and recording of field book

• Chain and compass survey

Meridian, bearing and its types, system of bearing,

Types of compass : prismatic and surveyor's compass.

Calculation of included angles, correction for local attraction.

7. **Levelling :**

• Terms used in leveling, use of Dumpy level, temporary adjustments.

Methods of reduction of levels, types of leveling, Contours, characteristics of contours, use of contour maps.

• Introduction to Auto level and use

• Introduction and use of EDM's with special reference to Total Station.

• Measurement of area by planimeter – mechanical and digital.

8. **Transportation Engineering:**

• Types of roads: introduction to NH, SH, MDR, ODR,
VR, Express Way

• Cross section of road – in cutting and filling

• Railway – Gauges, Cross-section of railway track.

Text Books:

1. Gupta, Sushil Kumar, DR and Juneja BM;"A Text Book of Building Construction";Ludhiana, Katson Publishing House
2. Arora, SP and Bindra, SP; "A Text Book of Building Construction"; New Delhi Dhanpt Rai and Sons,
3. Sushil Kumar; "Building Construction"; Standard Publishers Distribution, Delhi
4. Peurifoy, RL, "Construction Planning, Equipment and Methods" Tokyo, McGraw Hill
5. Wakhlo, ON :Civil Engineering Management", New Delhi Light and Life Publishers

2.6 WORKSHOP PRACTICE/MANUFACTURING PRACTICE

1. **CARPENTRY AND PATTERN MAKING :** Various types of timber and practice boards, defects in timber, seasoning of wood; tools, wood operation and various joints; exercises involving use of important carpentry tools to practice various operations and making joints.

2. **FOUNDRY SHOP** Introduction to moulding materials; moulds; use of cores; melting furnaces; tools and equipment used in foundry shops; firing of a cupola furnace; exercises involving preparation of small sand moulds and castings.

3. **FORGING PRACTICE:** Introduction to forging tools; equipments and operations; forgability of metals; exercises on simple smithy; forging exercises.

4. **MACHINE SHOP** machines, grinders etc; cutting tools and operations; exercises involving awareness.

5. **WELDING SHOP:** Introduction to different welding methods; welding equipment; electrodes; welding joints; welding defects; exercises involving use of gas/electric arc welding.

6. **ELECTRICAL & ELECTRONICS SHOP** Introduction to electrical wiring; preparation of PCBs involving soldering applied to electrical and electronic applications; exercises preparation of PCBs involving soldering applied to electrical and electronic applications.

7. **SHEET METAL:** Shop development of surfaces of various objects; sheet metal forming and joining operations, joints, soldering and brazing; exercises involving use of sheet metal forming operations for small joints.

8. **FITTING SHOP** Introduction of fitting practice and tools used in fitting shop;exercise involving marking, cutting, fitting practice (Right Angles), male- Female mating parts practice, trapping practice.

TEXT BOOKS

1. Raghuwanshi, B.S. ; A course in Workshop technology, Vol 1 & II, Dhanpat Rai & Sons , New Delhi.
2. Jain, R.K. ; Production Technology, Khanna Publishers, New Delhi.
3. Singh, S, ; Manufacturing Practice, S.K. Kataria & Sons, New Delhi

2.7 CHEMISTRY LABORTOARY

LABORATORY WORK

List of Experiments:-

1. Preparation and standardization of solutions: NaOH, HCl, H_2SO_4 and Oxalic acid
2. To determine the hardness of water sample by EDTA method. (ALL)
3. To determine the acidity of water sample.
4. To determine the amount of residual chlorine in water sample.
5. To determine the total cation conc. In natural water sample using ion exchange resin.
6. To determine COD of a effluent sample.
7. Estimation of rate of corrosion of aluminium in acidic and basic medium.
8. Calorimetric determination of Copper.
9. Verification of Beer's law
10. To determine the surface tension of a liquid using drop no. method.
11. To determine the viscosity of the given liquid by Redwood viscometer.
12. To determine the acid value of the given oil.
13. To determine flash point and fire point of a lubricating oil
14. To determine the mol. Wt. Of polystyrene by viscosity measurements.
15. To determine melting point and/or glass transition temperature of a polymer.
16. .To prepare the pure and dry sample of Urea Formaldehyde resin.
17. To prepare the copper ammonia complex
18. Preparation of nano-oxide using combustion method
19. .Estimation of moisture and ash content in a given sample of coal.

2.8 COMMUNICATION LABORTOARY

Teacher should give following Assignments to students to develop skills of communicating effectively:

- communication cycle(with the help of Diagram)
- Communication Situation (List of 5 Communication situation stating the type of communication.
- Barriers that hinder a particular communication situation.(state the type of barrier, and how to overcome them)
- Developing a story or a paragraph for the given tiopic sentence (in a group of 5-6 students)
- Describing various equipments.

- Identifying the various sentences with their types of writing(e.g. Scientific , legal, colloquial etc.)
- Business letters
- Letters of suggestion
- Comparative Time Table of 2 students
- Description of two different person.
- Letter to the Librarian, Principal
- Report writing.

2.9 BASIC ELECTRONICS LABORATORY

List of Experiments:

1. To study the use and scope of using an oscilloscope as a measuring device in an electronic laboratory.

2. To study the use and scope of using a multimeter (digital and analog) as a measuring device in an electronics laboratory.

3. To study the use and scope of function generator as a signal source in an electronics laboratory.

4. Draw forward bias and reverse bias VI characteristics of a p-n junction diode

5. Draw the characteristics of a zener diode.

6. To study and plot waveform of half wave rectifier with and without filter circuits.

7. To study and plot waveform of full wave rectifier with and without filter circuits.

8. Study Zener diode as voltage Regulator.

9. Draw characteristics of common base configuration of p-n-p transistor.

10. Draw characteristics of common emitter configuration of an npn transistor.

11. Draw characteristics of common drain configuration of a MOSFET.

C. THIRD SEMESTER

3.1 PRINCIPLES OF ECONOMICS & MANAGEMENT

MODULE-I

Economics : Definitions, Nature & scope of Economics, Economics Systems-meaning of Capitalism, Socialism & mixed economy.

Demand And Supplies Analysis: Law of demand and supply, exception to the law of demand, Elasticity of demand and supply and their types, Methods of measuring elasticity of demand and supply.

Theory Of Production : Scales of production, Law of returns, Break even analysis.

Monetary System: Monetary Policy – Meaning, objectives, methods, Fiscal policy – Meaning & objectives of fiscal policy in a developing country like India, Functions of Reserve Bank of India and commercial banks.

MODULE-II

Economics & Business Environment: Privatization –Growth of private capitalism in India, Business/Trade Cycles – Meaning, Characteristics & classification, Foreign capital & economic development.

Management Principles: Meaning & types of Management, Concept of Scientific Management, Management By Objectives, System Approach to Management.

Financial Management: Meaning, functional areas of financial management, Sources of Finance, Meaning of financial accounting, accounting principles-concepts & conventions, Importance of final accounts – profit & loss a/c and balance sheet, Need and importance of capital budgeting.

MODULE-III

Marketing Management: Introduction to marketing management, Market segmentation, Developing & managing advertising programs, Deciding on media & measuring effectiveness.

Production Management: Procedure for production planning & Control, Plant Location & Lay-out, Routing, Scheduling, CPM & PERT

Quality Management: Statistical Quality Control, introduction Control Charts, X Charts, R Charts, Control Charts for C (N. of defects per unit), Control chart for P(Fraction defective), Advantages & Limitations of SQC, Quality Circles:- Structure, functions & Limitations.

Text Books:-

1. *Dewett , K.K., Modern Economic Theory , S.Chand & Co*
2. *Singh,B. P. and Chabra, T. N., Business Organisation & Management, Dhanpat Rai & Sons*
3. *Kotler, Philip., Marketing Management, PHI*
4. *I.M. Pandey., Financial Management, Vikas Publishing House Pvt. Ltd.*

Reference Books:-

1. *Ruddar Dutt, K.P.M.Sundaram., Indian Economy, S.Chand & Co.*
2. *Ahuja, H.L, Advanced Economic Theory, S.Chand & Co.*
3. *Grant, Leaven worth, Statistical Quality Control ,TMH*
4. *Edwin B.Flippo, Personnel Management , TMH*
5. *Koontz Harold, Management – A Global Perspective, TMH*

3.2 ANALOG ELECTRONICS-I

Diode Circuits: PN diode as a circuit element, rectifier and determination of rms, average value, ripple factor and regulation,and rectifier efficiency capacitor input, inductor input, RC and RL filter circuits, diode as clipping and clamping circuit element. Diode as Peak Detector.

Bipolar junction Transistors: Concept of Transistor biasing and various biasing techniques. introduction to AC and DC load LIne Calculation of Currnet gain Voltage gain using DC load Line Selection and Stabilization of operating Point against Ico, VBE and Beta variation, Bias compensation methods and thermal runaway. Determination of h parameters from transistor characteristics. H-parameter equivalent circuit of transistor. Conversion of h parameter from CB to CE and CC configuration. Graphical analysis of transistors as an amplifier.

Field Effect Transistors: Construction and characteristics of junction field effect transistor (JFET), MOSFET (both depletion and enhancement type), CMOSFET's, parameters and equivalent circuit of an FET, biasing of FETs, FET as an amplifier in CS configuration, Biasing circuits using FET.

Small Signal Low Frequency Transistor: Analysis of transistor amplifier using h-parameters in CB, CE and CC configuration. Comparison of three configurations in term A1, A21, R1, R0. Frequency response of amplifier. Effect of an emitter bypass capacitor, coupling capacitor, emitter resistance and shunt capacitors on frequency response of amplifier. Analysis of emitter follower using Miller's theorem.

Integrated Circuits: Introduction, Fabrication process, Oxidation, Diffusion, ion implantation, photolithography, n-tub, p-tub and twin-tub CMOS process.

Text Books:-

1. *Millman- Halkias, Electronic Devices & Circuits by, TMH*
2. *Donald A. Neamen, Electronic Circuit Analysis and Design, MH*

Reference Books:-

1. *Streetman, G . Ben, Solid state devices', , PE*
2. *Donald A Neaman, 'Semiconductor physics and devices', MH*
3. *Sheng. S.Li, 'Semiconductor physical electronics', Plenum press*

3.3 DIGITAL ELECTRONICS

Fundamentals Of Digital and Number System; 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.

Combinational Design Using Gates and MSI Devices: Design using gates like Half & full adder, Half & full subtract , parallel adder, binary adder, Magnitude comparator, Encoder and Decoders, Multiplexers and Demultiplexers, Code converters ,parity generator/checker, Drivers for display devices, Karnaugh map and Quine Mcluskey methods of simplification.

Synchronous and Asynchronous Sequential Circuits: Flip Flops : S-R, J-K, T, D, master-slave, Edge triggered and clocked flip-flop, timing and waveforms, Shift Registers, Counters, Design of Synchronous and Asynchronous sequential circuits, Up-down counter, BCD Counter , Modulus counters , Ring counters and Johnson Counter.

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 : Quantization, parallel -comparator, successive approximation, counting type, dual-slope ADC, specifications of ADCs.

Digital Logic Families: Bipolar and Unipolar logic families: RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families. Tristate logic, Interfacing of CMOS and TTL families, Comparison of logic families.

Semiconductor memories and Programmable Logic Devices: Introduction, Memory organisation, Classification and characteristics of memories, Sequential memories, ROMs, R/W memories. Content addressable memories, PLA, PAL, FPGA and CPLDs. Charged-Coupled device memory.

Text Books:-

1. *Taub & Schilling, Digital Integrated Electronics : MGH*
2. *Jain , R. P, Modern Digital Electronics; TMH*
3. *Morris Mano; Digital Design : PHI.*

Reference Books:-

1. *Floyd, "Digital Fundamentals", Universal Book Stall*
2. *Albert Paul Malvino and Donald P Leach, "Digital principles and applications",TMH*

3.4 ELECTRONICS MEASUREMENT AND INSTRUMENTATION

Basic Measurement Concept : Classification of Instruments (Based upon mode of measurement); Absolute and Secondary Instruments, Based upon Principle of Operation, Based upon function – Indicating, Recording and Integrating Instruments); Generalized Instrument (Block diagram and description of various blocks). The three forces in an Electromechanical indicating instrument (Deflecting controlling, deflecting and damping). Measurement systems – Static and dynamic characteristics – units and standards of measurements – error analysis – moving coil, moving iron meters – multimeters – True RMS meters

Measurement Of Resistance, Capacitance And Inductance :DC BRIDGES - Limitations of Whetstone bridge; Kelvin's double bridge method AC BRIDGES - General Balance Equation; Circuit diagram; Phasor diagram and Advantages as well as Disadvantages and Applications of Maxwell's inductance; Maxwells Inducance - Capacitance bridge; Hays, Anderson, Ownens; De-Sauty's Schering and Weins bridges.

Electronic Measurement : Electronic multimeters – Cathode ray oscilloscopes – block schematic – applications – special oscilloscopes – Q meters – Vector meters – RF voltage and power measurements.

Signal Generators And Analyzers : Function generators – RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer. **Digital Instruments :** Comparison of analog and digital techniques – digital voltmeter – multimeters – frequency counters – measurement of frequency and time interval – extension of frequency range – measurement errors.

Instrumentation : Transducers, classification & selection of transducers, strain gauges, inductive & capacitive transducers, piezoelectric and Hall-effect transducers, thermisters, thermocouples, photo-diodes & photo-transistors, encoder type digital transducers, signal conditioning and telemetry, basic concepts of smart sensors and application. Data Acquisition Systems.

Text Books:-

1. *Sawhney, A .K., Electrical and Electronic Measurement & Instrumentation: Dhanpat Rai*
2. *Golding , E. D., Electrical Measurements*
3. *Gupta, J.B, Electronic & Electrical Measurement & Instrumentation;, Kataria & Sons*
4. *Cooper , W.D. & A.D. Helfrict , Electronic Instrumentation & Measurement Technique.*

Reference Books:-

1. *Doeblm , Measuring Systems , TMH*
2. *Joseph J.Carr, Elements of Electronics Instrumentation and Measurement, PE*
3. *Alan. S. Morris, Principles of Measurements and Instrumentation, PHI*

3.5 MICRO-PROCESSOR AND IT'S PERIPHERALS

Introduction To Microprocessor : Basic block diagram of microprocessor, Architecture trends of microprocessor, Classification of computers, Evolution of microprocessors, Programming Development Tools (Editor, Debugger, Assembler, etc.).

8-Bit Microprocessor (Intel 8085) : Internal Architecture of Intel 8085, Block Diagram, Registers, Internal Bus Organization, Pin Description, Control Signals.

Instruction set, classification of instructions, Addressing Modes, Timing Diagrams of 8085. Programs based on Data Transfer, Arithmetic & Logical operations, Code Conversion, Stack & Subroutines, Delay subroutines (with a register and register pair), Interrupt structure.

Peripherals And Interfacing With 8085 : 8255 Programmable Peripheral Interface, 8253 Programmable Interval Timer, 8257 DMA Controller, 8259 Programmable Interrupt Controller, 8279 Programmable Display Keyboard Controller.8251 LED, 7 – segment display, relay, keyboard, stepper motor, ADC & DAC, Memory interfacing.

16-Bit Microprocessor (Intel 8086) : Architecture, Memory addresses space & data organization; Segment Registers & Memory Segmentation, I/O Address space; Addressing Modes. Comparison of 8086 & 8088. Basic 8086/8088 configuration; Minimum mode & Maximum Mode.

Text Books:-

1. *Microprocessor Architecture, Programming and Applications—Gaonkar, WE*
2. *Microprocessor and Programmed Logic--K.L.Short, PE*
3. *Fundamentals of Microprocessor & Microprocomputers-- B. Ram, TMH.*
4. *Microprocessor and Digital System – Dougles Hall- TMH.*

Reference Books:-

1. *Intel's Data Manuals.*
2. *Microprocessor H/W Interfacing and Application – Bray – CBS*
3. *Microprocessors and Peripherals—B. Venkatramani, TMH.*
4. *The 8086/8088 family: Design, Programming, and Interfacing by – John Uffenbeck.*
5. *Ajoy Kumar Ray & Kishor M.Bhurchandi, "Advance Microprocessors & Peripherals" (Architecture, Programming & Interfacing), TMH*

3.6 NETWORK ANALYSIS & SYNTHESIS

Network Concept And Circuit Element: Network Graph: Matrices associated with Graphs; Incidence, fundamental cut set and fundamental circuit matrices-Independent and dependent Sources-Signal and Waveforms, Periodic and Singularity voltages , Step , Ramp, Impulse, Doublet,-Nodal and Mesh Analysis-Network Theorems: Superposition theorem, Norton Theorem, Maximum Power Transfer, Reciprocity.

Time And Frequency Domain Analysis: Time and Frequency Domain Analysis of simple RLC circuits (Transient and steady state analysis), Laplace Transform of shifted functions, Time Domain behavior from Pole and Zero, Convolution Theorem and Circular Convolution.

Network Synthesis: Network Functions-Impedance and Admittance function, Driving point and Transfer Function, Relationship b/w Transfer function and Impulse function, Restriction of Poles and Zero location of network functions, Network Function for two terminal pair network-Driving point and Transfer function-State equality for networks- 2 port network parameters, Foster and Cauer Form-Solution of network equation using laplace transform.

Filter Synthesis: Classification of filters-Characteristic Impedance and Propagation constant of pure reactive network – Ladder Network-T section- Pie section, Terminating Half section- Pass Band and Stop Band, Design of constant K, m-derived filter-Composite filter.

Text Books:-

1. *Van Valkenberg, Network Analysis and Synthesis*
2. *Sudhakar Sham Mohan, Network Analysis and Synthesis*

Reference Books:-

1. *Chakraboty, Circuit Theory*
2. *Franklin F.Kuo , Network Analysis and Synthesis ; JW*

3.7 ANALOG ELECTRONICS LABORTOARY

LABORATORY:

1. Study of Half wave, full wave & Bridge rectifiers.
2. Study of simple capacitive, T & ⍰⍰filters
3. Study of Zener regulator.
4. To plot the input and output characteristics of CE configuration.
5. To plot the input and output characteristics of CB configuration.
6. Determination of h- parameters of a transistors using output characteristics.
7. Design of transistor biasing circuits.
8. Study of frequency response of RC coupled amplifier.
9. Study of an emitter follower circuit.
10. To plot JFET characteristics in CS configuration.
11. Study of frequency response of CS- FET amplifier

3.8 DIGITAL ELECTRONICS LABORTOARY

LABORATORY EXPERIMENTS:

1. Verification of the truth tables of TTL gates, e.g., 7400, 7402,7404, 7408, 7432, 7486.
2. Design and verification of the truth tables of half adder and full adder circuits using gates 7483.
3. (a) Verification of the truth table of the Multiplexer 74150

   (b) Verification of the truth table of the De-Multiplexer 74154
4. (a) Design and test of an S-R flip-flop using NOR/NAND gates.

   (b) Verify the truth table of a J-K flip-flop (7476)

   (c) Verify the truth table of a D flip-flop (7474) and study its operation in the toggle and asynchronous modes.
5. To design and Verification of the operation of bi-directional shift register.
6. To design and Verification of the operation of 3-bit synchronous counter.
7. To design and Verification of the operation of synchronous UP/DOWN decade counter using J K flip-flops.
8. (a) Verify the truth table of decoder driver 7447 / 7448. Hence operate a 7 segment LED display through a counter using a low frequency clock.

   (b) Repeat the above with the BCD to Decimal decoder 7442 and an array of LEDs,
9. (a) Verify the truth table of converters Gray to BCD.

   (b) Verify the truth table of converters BCD to Gray.
10. Design a 4-bit shift-register and verify its operation. Verify the operation of a ring counter and a Johnson counter.

3.9 ELECTRONIC MEASUREMENT & INSTRUMENTATION LABORTOARY

LIST OF EXPERIMENTS

1. To convert & calibrate a D' Arsonnal type galvanometer into a voltmeter & an ammeter.
2. To measure low resistance by Kelvin's double bridge.
3. To measure capacitance by De Sauty's bridge.
4. To measure inductance by maxwell's bridge.
5. To measure frequency by Wien's bridge.
6. To measure frequency, time period of a signal using CRO.
7. To analyze lissegious patterns on CRO.
8. To measure quality of coil using Q-meter.
9. To measure strain factor using strain gauge.
10. Study of LVDT for measurement of displacement.

3.10 MICROPROCESSOR LABORTOARY

LABORATORY EXPERIMENTS:

Software Based (Using 8085 And 8086 Instruction Sets)

1. Arithmetic operation on two 8 bit numbers
2. Addition and subtraction of two 16-bit numbers.
3. Operation on two 16-bit BCD numbers.
4. Searching of the smallest and largest element in a block of data.
5. Sorting the elements of a block of data in ascending and descending order.
6. Converting 2 digit numbers to their equivalents. a) BCD to HEX and b) HEX to BCD

Hardware Based (Interfacing With 8085)

1. Program controlled data transfer using 8255 PPI.
2. Interfacing 7 segment LED display using 8255A – in static and dynamic mode.
3. Interfacing keyboard-using 8279.
4. Interfacing display-using 8279.
5. Interfacing ADC 0808/0809.
6. Interfacing DAC 0808.
7. Interfacing stepper motor with microprocessor using 8255.
8. Interfacing of 8253 / 8254.
9. Interfacing of 8251.

D. FOURTH SEMESTER

4.1 ANALOG COMMUNICATION SYSTEM

Base Band Signals and Systems: Introduction, Elements of communication system, Modulation & Demodulation, Mixing; Linear & Nonlinear, need of modulation, types of modulation systems, basic transmission signals.

Analog Modulation Techniques: Introduction, theory of amplitude modulation; AM power calculations, AM current calculations, AM modulation with a complex wave, theory of frequency modulation; mathematical analysis of FM, spectra of FM signals, narrow band of FM, Wide band FM, Theory of phase modulation, phase modulation obtained from frequency modulation, comparison of AM & FM, Comparison of PM & FM.

AM Transmission: Introduction, generation of Amplitude Modulation, Low level and high level modulation, basic principle of AM generation; square law modulation, Amplitude modulation in amplifier circuits, suppressed carrier AM generation (Balanced Modulator) ring Modulator, Product modulator/balanced Modulator.

AM Reception: Receiver Parameters; Selectivity, Sensitivity, Fidelity, Tuned Ratio Frequency (TRF) Receiver, Super heterodyne Receiver; Basic elements of AM superheterodyne Receiver; RF Amplifier, Neutralization of RF Amplifiers, Class of operation of RF Amplifiers, High power RF Amplifiers, Image Frequency Rejection, Cascade RF Amplifier, methods of increasing Bandwidth, frequency Conversion and Mixers; Additive Mixing, Bipolar Transistor Additive Mixer, self exicted Additive Mixers, multiplicative mixing, Multiplicative Mixer using dual gate MOSFET, Tracking & Alignment, IF Amplifier, AM detector; square law detector, Envelope or Diode detector, AM detector with AGC, Distortion in diode detectors, AM detector Circuit using Transistor, Double hetro-dyne receiver, AM receiver using a phase locked loop (PLL), AM receiver characteristics.

FM Transmission: FM allocation standards, generation of FM by direct method, varactor diode Modulator, Cross by Direct FM Transmitter, Phase-Locked-Loop Direct FM Transmitter, Indirect generation of FM; Armstrong method, RC phase shift method, Frequency stabilized reactance FM transmitter.

FM Reception: Frequency demodulators, Tuned circuit frequency discriminators; Slope Detector, Balance Slope Detector, Foster Seeley discriminator, Ratio Detector, FM detection using PLL, Zero crossing detector as a Frequency Demodulator, quadrature FM demodulator, pre emphasis and de emphasis, limiter circuits, FM Capture effect, FM receiver, FM stereo transmission and reception, Two way FM Radio Transmitter and Receiver.

SSB Transmission: Introduction, Single Side band systems, AM-SSB; Full carrier, Suppressed carrier , reduced carrier, Independent side band, and Vestigial side band, Comparison of SSB Transmission to conventional AM, Generation of SSB; Filter method, Phase Shift Method, Third Method.

SSB Reception: SSB Product Demodulator, Balanced Modulator as SSB Demodulator, Single Side band receivers; Single side band BFO Receivers, Coherent Single side band BFO Receivers, Single Side band Envelop detection receiver, Multi Channel Pilot Carrier SSB Receiver.

Pulse Modulation Transmissions and Reception: Introduction, Sampling Theorem Pulse Amplitude Modulation (PAM), Natural PAM Frequency Spectra for PAM , Flat-top PAM, Sample and hold circuits, Time division Multiplexing, PAM Modulator Circuit, Demodulation of PAM Signals, Pulse Time Modulation (PTM); Pulse Width Modulation(PWM), Pulse Position Modulation (PPM), PPM Demodulator.

Text Books:

1. *Wayne Tomasi, "Electronic Communication System Fundamentals through Advance" PE*
2. *Symon Hykens "Analog Communication Systems" John Wiley & Sons .*
3. *Taub & Schilling "Principles of Communication System" TMH*
4. *Roody Coolean "Electronic Communication Systems" PHI*

4.2 ANALOG ELECTRONICS-II (Electronics Device & Circuit)

High Frequency Transistor: The high frequency T model, common base short circuit current frequency response, alpha cutoff frequency, common emitter short circuit current frequency response, hybrid pi CE transistor model, hybrid pi conductance in terms of low frequency h parameters, CE short circuit current gain obtained with hybrid pi model, current gain with resistive load.

Large Singal Amplifiers: Class A direct coupled with resistive load, Transformer coupled with resistive load, design theory, power amplifier design, harmonic distortion, power output, variation of output power with load, thermal runaway, output transformer saturation, push-pull amplifiers, operation of class- A push-pull amplifier, class- B push-pull amplifier, crossover distortion, class AB push-pull amplifier, transistor phase inverter, conversion efficiency of class B amplifiers, design of Class- B push-pull amplifier, complementary- symmetry amplifier.

Multistage Amplifiers: Coupling of transistor amplifiers, frequency response of coupled amplifiers, cascading of RC coupled amplifiers and their analysis. Tuned Amplifiers: single tuned, double tuned and stagger tuned amplifiers and their analysis.

Feedback In Amplifiers: Types of feedback, effect of negative feedback on gain, bandwidth, stability, distortion and frequency response etc. Voltage series, current series, voltage shunt, current shunt feedback circuits and their analysis.

Oscillators: Conditions of oscillations. Different types of oscillators: RC Phase Shift, Wein Bridge, Hartley, Colpitts and Crystal Oscillators. Derivation of expression for frequency and amplitude of these oscillators.

Regulated Power Supplies: Zener diode as Voltage Regulator, Transistor Series and Shunt Regulators, Current limiting, Line and Load Regulation.

Text Books:-

1. *Millman- Halkias , Electronic Devices & Circuits, TMH*
2. *Boylestad , Electronic Devices & Circuits Theory, PHI*

Reference Books:-

1. *Mottorshead, Electronic Devices & Circuits, PHI*
2. *Donald A. Neamen, Electronic Circuit Analysis and Design, MH*

4.3 ELECTROMAGNETIC FIELD THEORY

Introduction: Coordinate systems and transformation: Cartesian coordinates, circular cylindrical coordinates, spherical coordinates Vector Analysis: Differential length, area and volume, line surface and volume integrals, del operator, gradient of a scalar, divergence of a vector and divergence theorem, curl of a vector and Stoke's theorem, Laplacian of a scalar.

Static Electric Fields: Coulomb's Law, Gauss's Law, potential function, field due to a continuous distribution of charge, electric flux density, equi-potential surfaces, Gauss's law, electric potential, potential gradient, Gauss's Theorem, Poison's and Laplace's equation, capacitance, boundary conditions, conduction current, Displacement current ,Equation of continuity,Uniqueness theorem.

Steady Magnetic Fields and Time Varying Fields: Magnetostatic fields, Biot-Savart's Law, Forces due to magnetic field, magnetic torque and moment, a magnetic dipole, magnetic boundary conditions,.Faraday Induction law, magnetic flux density, Ampere's circuit law, Inconsistency of Ampere's law , Maxwell's field equations and their interpretation, solution for free space conditions, in point and integral forms , surface impedance ,Poynting's theorem

Electromagnetic waves: EM Waves equations in various forms, EM Waves in a homogeneous medium, propagation of uniform plane-wave, relation between E & H, wave equations for propagation in a lossless medium, conducting medium, good dielectric, good conductor, Depth of penetration, phase and group velocity, skin depth, Polarization.

Reflection and refraction of plane waves at the surface of a perfect conductor & perfect dielectric (both normal incidence as well as oblique incidence), Brewester's angle and total internal reflection, reflection at the surfaces of a conductive medium.

Guided Waves and wave Guides: Waves between parallel planes. TE and TM waves and their characteristics.

TEM waves, velocities of propagation, Attenuation in parallel plane guides, wave impedance. Rectangular Wave Guides: Introduction, TE and TM waves in rectangular waveguide, Dominant mode, Impossibility of TEM waves in wave guides, Wave impedance and characteristic impedance, Excitation methods for various modes. Circular Wave Guides: TE and TM waves in circular waveguide-,Wave impedance, Attenuation factor and Q of wave guides, Excitation modes in circular wave guides.

Transmission Line Theory: Transmission line parameters, line equations, input impedance, travelling ,standing waves , characteristic impedance, Reflection coefficient, SVR, VSWR and power, The Smith chart, Impedance matching, Applications of transmission lines.

Text Books:-

1. *Edward C.Jordan and Keith G.Balaman,"Electromagnetic waves and radiating systems", PHI*
2. *Krauss J.DF , Electro-Magnetics :; MH*

Reference Books:-

1. *David.K.Cheng, "Field and wave Electromagnetics",PE*

2. *W. H. Hayt and J. A. Buck, "Electromagnetic field theory", TMH*
3. *G.S.N. Raju, "Electromagnetic field theory and transmission lines", PE*

4.4 LINEAR INTEGRATED CIRCUITS AND SYSTEM

Differential Amplifiers: Introduction, Differential Amplifier and their Circuit Configuration, Dual Input-Balanced output & Unbalanced output Differential Amplifier, Single Input-Balanced output & unbalanced output Differential Amplifier with their DC and AC analysis, Differential Amplifier with swamping resistors, Constant current bias, Current Mirror, Cascaded differential Amplifier , Level Translator, CE-CB configuration.

Operational Amplifiers: Block diagram of Op-Amp, Schematic symbol, integrated circuits and IC package their types, Pin diagram, Overview of data sheets, Ideal Op-Amp, Equivalent circuit of an Op-Amp, Ideal voltage transfer curve, Open loop configurations : Differential, Inverting & Non Inverting. Close loop configuration : Inverting, non- inverting differential amplifier, unity gain amplifier (voltage follower), sign changer.

Practical Characteristics And Parameters Of Op-Amp: Input offset voltage, Input offset current, Input bias current, differential input resistance, Input capacitance, Input voltage range, offset voltage adjustment, SVRR, large signal voltage gain, supply voltages, supply current, output voltage swing, output resistance, slew rate, gain bandwidth product, output short circuit current, Temperature and supply voltage sensitive parameters, Noise, Common Mode configuration and CMRR.

Feedback Configurations And Frequency Response In Op-Amps: Block diagram of feedback configurations, Voltage-series and voltage shunt feedback amplifier, Differential amplifiers with one two and three op-amps. Frequency response, Compensating Networks, Frequency response of Internally compensated and Non compensated Op-amps, Closed loop frequency response, causes of slew rate and its effect on applications

Applications Of Op-Amp: DC and AC amplifiers, Peaking Amp, Summing, Scaling and Averaging Amp, Instrumentation Amplifier, Log and Antilog Amp, Integrator, Differentiator, Peak Detector, Comparator, Zero crossing detector, Schmitt trigger, window detector, Sample and Hold Circuit.

AS FILTERS: First order , Second order Low Pass Butterworth filter, First order, Second order High Pass Butterworth filter, Band pass filter, Band reject filters, All pass filter, Phase shift oscillator, Wein bridge oscillator, Quadrature oscillator, Square wave, Triangular wave, Saw tooth wave generator, Voltage controlled oscillator.

As Converters: Voltage to current and Current to voltage converter, Voltage to Frequency and Frequency to Voltage converters, ADC and DAC converters,

Special Function Ic's And Their Applications: Introduction to timer IC 555, Pin configuration, Block diagram, Application of 555 as Monostable and Astable Multivibrator, Block diagram of Phase Lock Loops IC565 , Application of PLL as frequency multiplier, FM demodulator, Fixed voltage regulators, Adjustable voltage regulators, Switching Regulators.

Text Books:- *1.Gayakwad. Ramakant , Op Amps & Linear Integrated circuits*

2. *Coughlin , Op Amps & Linear Integrated circuits*
3. *Dudeja , Op Amps & Linear Integrated circuits*

4.5 SIGNAL AND SYSTEM

System And Signal Analysis: Classification of signals and systems, definition and properties of linear transform, signal representation using fourier series, complex exponential fourier series, fourier series representation of periodic signals, periodic signal representation using fourier transform, fourier transform of periodic power signals, power spectral density, system response impulse, step and time domain response analysis, transfer function and frequency Domain analysis effect of Transfer function on spectral densities, Stationary of non-Transients, Linear time invariant (LTI) systems, Signal transmission through LTI systems, Discrete Fourier Transform, Fast Fourier transform (FFT),

Laplace transform: Basic theory of Laplace transforms ,Inverse Laplace transform. application of Laplace transform to solve the initial value problem. Translation theorems. Laplace transform of direct – δ Function and more properties of L-transform, Convolution theorem, Laplace transform of periodic function, Laplace Transform method for the solution of some partial differential equation,

Z transform: Introduction, Basic theory of Z transform, Solution of difference equation using Z transform.

Random Signal Theory: Introduction to probabilities Definition, probability of Random events, Joint and conditional probability, probability Mass function statistical averages, Probability density functions and statistical averages, Examples of P.D. function, transformation of random variables random processes, stationary, true averages and ergodic, Convolution theorem, its graphical interpretation, Conditional function with a unit Impulse function, Relationship between transfer and impulse response, poles and zeros, parallel and cascade structure, frequency response, group delay and phase delay.

Signal Transmission Through Linear Networks: The sampling theorem low pass and band pass network, matched filter, input output relations with random inputs, envelope detector, equivalent noise band width Noise. Introduction to thermal noise, shot noise partial noise, low frequency or flicker, Gaussian Noise, burst noise, avalanche noise bipolar transistor noise, F.E.T. noise, Equivalent input noise signal to noise ration, noise factor, amplifier input noise in terms of F-Noise factor or amplifiers, Noise temperature, Noise equivalent Bandwidth, Noise figure, Experimental determination of noise figure, Pulse response & Digital No. & elimination.

Text Books:-

1. *Simon Haykin ,Communication Signal and Systems*
2. *Oppenheim and Willsky , Signal and Systems, PE*
3. *Network Analysis and Synthesis by Sudhakar Sham Mohan*

Reference Books

1. *Chakraboty, Circuit Theory*
2. *Robert , M.J Signals and Systems , TMH*

4.6 NUMERICAL & STATISTICAL METHOD

1. **Errors in Numerical Calculations**

Errors and their analysis, general error formula, errors in a series approximation

2. Solution of algebraic and Transcendental equations: Bisection method, iteration method, Method of false position,, Newton -Raphson method, solution of systems of non linear equations, method of iteration

3. **Interpolation method:**

Errors in polynomial interpretation, finite difference , forward, backward and central difference, Difference of a polynomial, Newtons formulae for interpolation, central difference intepolation formulae, Interpolation with unevenly spaced points, Newton's general interpolation formula, interpolation by iteration

4. **Curve Fitting:**

Cubic splines and approximation:introduction, Least square curve fitting,,Procedures -fitting a straight line, non linear curve fitting, curve fitting by a sum of exponentials, Data fitting with cubic splines-derivation of governing equation, end conditions

5.**Numericl Differentiation and Integration**

Numerical differentiation- cubic spline method: maximum and minimum values of a tabulated function; Numerical Integration- trapezoidal rule, Simpson1/3 rule, Simpsons 3/8 rule, Newton-cots integration formulae; Euler-Meclaurin formula, Gaussian integration(One dimensional only)

6.**Matrices and Linear systems of equations**

Introduction, Inverse of Matrix, Solution of linear systems, Matrix inversion method, Gaussian Elimination method(fall and banded symmetric and unsymmetric systems), Eigen value problems

7. **Numerical solution of ordinary differential equations:**

Solution by Taylor's series, Prediction -correction method, Boundary value problems, Prediction corrector method, Euler's and modified Euler's method, Runge-Kutta method, finite difference methods

8. **Numerical solution of Partial differential equations**

Finite difference approximation to derivatives, Solution to Laplaces equation- Jacobi's method, Gauss - Siedel method, S.O.R method, Parabolic equation and their solution using iterative methods

Books:

1. Computer Oriented Numerical Methods- V. RajaRaman
2. Numerical Methods in Fortran -Mc Cromik and Salavadory
3. Elementary Numerical Analysis, S.D. Conte, & Cari De Boor. Mc Graw Hill.
4. Applied Numerical Methods, Cornahn B., Et al, John Wiley

4.7 ANALOG COMMUNICATION LABORTOARY

LIST OF EXPERIMENTS:

1. To obtain Amplitude modulated Envelop and determine depth of modulation
2. To study envelop detector for demodulation of AM signal and observe diagonal peak clipping effect.
3. Frequency modulation using voltage controlled oscillator.
4. Generation of DSB-SC signal using balanced modulator.
5. Generation of single side band signal
6. To generate a FM Signal and measure Depth of modulation.
7. Detection of FM Signal using PLL.
8. To Study Super heterodyne AM receiver and measurement of receiver parameters viz. sensitivity, selectivity & fidelity.
9. Familiarisation of PLL, measurement of lock and capture range, frequency demodulation, frequency multiplier using PLL.
10. Sampling Theorem & Reconstruction of Signal from its lsamples using Natural Sampling, Flat Top Sampling & Sample & Hold Circuits.
11. To study the circuit of PAM modulator & Demodulator
12. To study the circuit of PWM modulator & Demodulator
13. To study the circuit of PPM modulator & Demodulator

4.8 LINEAR INTEGRATED SYSTEM LABORTOARY

LABORATORY EXPERIMENTS:

1. Measurement of parameters of IC 741 (such as CMRR, SVRR, offset adjustment)
2. To assemble inverting and non inverting amplifier and draw input output waveforms.
3. To assemble addition and subtraction of analog signal using OPAMP
4. Observe output of active integrator for different types of input (sine and square)
5. Observe output of active differentiator for different types of input (sine and square)
6. Plot the graph of input and output for V to I converter and I to V converter
7. To assemble logarithmic and antilogarithmic amplifier and verify its output.
8. To assemble zero crossing detector and active peak detector.
9. To assemble and plot the output waveform for a stable multivibrator, voltage control oscillator using IC 555.
10. To assemble and plot the output waveform for bistable multivibrator and schmitttrigger using IC 555.
11. Design monostable multivibrator using IC 555 and troublshoot.
12. Plot the frequency response of second order butterworth low pass filter.
13. Plot the frequency response of first order butterworth band pass filter/ band reject filter.

4.9 ANALOG ELECTRONICS LABORTOARY

LABORATORY EXPERIMENTS: The objective shall be to study

1. various coupling techniques for transistor amplifiers.
2. characteristics of a Class- A amplifier.
3. characteristics of Class- B amplifier.
4. characteristics of Class-C amplifier.
5. characteristics of Class- AB amplifier.
6. characteristics of Class- B push-pull amplifier.
7. characteristics of complementary symmetry amplifier.
8. response of RC phase shift oscillator and determine frequency of oscillation.
9. response of Hartley oscillator and determine frequency of oscillation.
10. response of Colpitt's oscillator and determine frequency of oscillation.
11. response of Wien Bridge oscillator and determine frequency of oscillation.

E. FIFTH SEMESTER

5.1 LINEAR CONTROL SYSTEMS

Introductory Concepts :

Plant, Systems, Servomechanism, regulating systems, disturbances, Open loop control systems, closed loop control systems, linear and non- linear systems, time variant & invariant, continuous and sampled data control systems, illustrative examples.

Modellinq :

Formulation of equation of linear electrical, mechanical, thermal, pneumatic and hydraulic systems, electrical and mechanical analogies. Use of Laplace transform, Transfer function, concepts of state variable modelling. Block diagram representation, signal flow graphs and associated algebra, characteristics equation.

Time Domain Analysis :

Typical test -input signals, Transient response of the first and second order systems. Time domain specifications, Dominant closed loop poles of higher order systems. Steady state error and co-efficient, polezero location and stability, Routh-Hurwitz Criterion.

Root Locus Technique :

The extreme points of the root loci for positive gain. Asymptotes to the loci, Breakaway points, intersection with imaginary axis, location of roots with given gain & sketch of the root locus plot. .

Frequency Domain Analysis:

Closed loop frequency response, Bode plots, stability and loop transfer function. Frequency response specification, Relative stability, Relation between time and frequency response for second order systems. A and N- circles, log. Magnitude versus Phase angle Plot, Nyquist criterion.

Compensation : Necessity of compensation, series and parallel compensators, compensating network, application of lag and lead compensation.

Control Components: Error detectors- potentiometers and synchros, servo motors, A.C. and D.C. techogenerators, Magnetic amplifiers.

Reference BOOKS

1. Modern Control Engineering by K. Ogata, Prentice Hall, N. Delhi, 1974
2. Control System components by J.F. Gibsen, McGraw Hill, 1963
3. Automatic Control System by B. C. Kuo. Prentice Hall 3rd Ed, 1978
4. Control System Engineering by I.J. Nagrath & Gopal, Wiley Eastern Ltd. N. Delhi, 1975

5.2 OBJECT ORIENTED PROGRAMMINH USING C++

1.Basics of C & C++

Introduction, Basics, Data Type, Bit Field integer, Operations, Control Structures, Storage Classes, User Defined Data Type, Reserved Words and Standard 110 Statements in C & C++ .

2. Object Orient Programming With C++

Introduction ,Object Oriented Programming Concept, Objective of OPP, Programming Structure in C++, Data Abstraction

3. Overloading and Information Hiding

Introduction, Function Overloading, Information Hiding

4. Memory Management in C++ :

Introduction ,Constructor-Automatic Initialization of Objects, Dynamic Memory Management , Default Constructor, Copy Constructor, Constructor and Information Hiding, Destructor-Automatic Clear up of an Object

5. Inheritance

Introduction, Inheritance-Data and Code Sharing , Class Derivation ,Ambiguity in Class Member Access ,Virtual Base Class-A Remedy , Class Initialization in Inheritance ,Arguments for the Base Class

6. Bindings and Polymorphism

Introduction , Bindings in C++, Polymorphism

7. Generic Facility

Introduction ,Concept of Generic Facility, Generic Function ,Overloading a Generic Function, Generic Classes

8. File Handling in C++

Introduction , Concept of Stream in C++, File Positioning Functions , Error Handling During File Operation

Reference Books:

1. The C++ Programming Language by B.Stroustrup, Pearson Education
2. Thinking in C++ by Bruce Eckel, Pearson Education
3. Object Oriented programming in C++ by N.Barkakati, PHI
4. Mastering C++ by Venugopal and et all, Tata McGraw Hill
5. C++ How to program by Detail and Detail, Pearson education

5.3 ANTENNA AND WAVE PROPAGATION

1. **Introduction**:Physical concept of Radiation in single wire, two wire, and dipole, Current Distribution on a thin wire antenna.

2. **Fundamental Parameters of Antenna**: Radiation Pattern, Radiation Power Density, Radiation intensity, Directivity, Gain, Antenna efficiency, Beamwidth, Bandwidth, Polarisation, Antenna Input Impedance, Elementary idea about self and mutual impedance, Radiation efficiency, Effective aperture, Antenna Temperature.

3. **Linear Wire Antennas:** Retarded potential, Infinitesimal dipole, Current distribution of short dipole and half wave dipole, Far-field, Radiating near-field and reactive near-field region, Monopole and Half wave dipole.

4. **Antenna Arrays:** Array of two point sources, Array factor, n-element linear array with uniform amplitude and spacing, Analysis of Broadside array, Ordinary end-fire array, Hansen-woodyard end fire array, n-element linear array with non-uniform spacing, , Analysis of Binomial and Dolph-Tschebyscheff array, Scanning Array, Superdirective array.

5. **Aperture Antennas:** Field Equivalence principle, Rectangular and circular aperture antennas, Horn antenna, Babinet's Principle, Slot Antenna, Reflector antenna.

6. **Ground wave Propagation:** Friis Free space equation, ,Reflection from earth's surface, Surface and Space wave propagation for vertical and horizontal dipole, Field strength of Space wave, Range of space wave propagation, Effective earth's radius, Effect of earth imperfections and atmosphere on space wave propagation, Modified refractive index, Duct propagation, Tropospheric propagation.

7. **Ionospheric Propagation:** Structure of ionosphere, propagation of radio waves through ionosphere, Refractive index of ionosphere, Reflection and refraction of waves by ionosphere, Critical frequency, Maximum usable frequency, Optimum working frequency, Lowest usable high frequency, virtual height, Skip Distance, Effect of earth's magnetic field.

Text Books:

1. Antenna Theory , Balanis C.A ,John Wiley & sons.
2. Electromagnetics and radiating systems, Jordan E.C.,PHI.

Reference Books:

1. Antenna and radio wave propagation, Collins R.E., McGraw Hill.

2. Antenna Theory , Krauss J.D.,McGraw Hill.

5.4 PULSE, DIGITAL & SWITCHING CIRCUITS

Linear Wave Shaping: High Pass circuits, Response to Standard waveforms, Differentiator, Double differentiation, Low pass circuits, response to standard waveforms, Integrator, Attenuator, RLC circuits, Ringing circuits.

Wide band Amplifiers: Frequency response of an amplifier, Short circuit current gain, Gain & Band width consideration, Compensation, Shunt compensation, Low frequency compensation, Distributed amplifiers.

Switching Characteristics of devices: Steady state and transient behaviors of electronic (Diode & transistor) Switches, Dynamic analysis of switches, Charge storage phenomena, Switching characteristics, Delay time, Rise time, Storage time and fall time, Use of Schotkey diode for reducing storage time. Behavior of MOS transistor as switch.

Non- Linear Wave shaping: Realization of clipping circuits (diode & transistor), comparators, champing circuits and sweep generators.

Multivibrators: Realization of astable, monostable, bistable, multivibrators using transistors, unsymmetrical, symmetrical triggering, Schmitt trigger circuits.

Text Books:-

1. *Milliman, Taub, Pulse and Digital Switching Circuits*
2. *G. K. Mithal, Pulse and Digital Switching Circuits*

5.5 DIGITAL COMMUNICATION SYSTEM

Digital Transmission: Introduction, Advantages of Digital Transmission, Pulse Code Modulation; PCM Sampling, Sampling Rate, Aliasing, quantisation error, Uniform and Non uniform quantization, Dynamic Range, Coding efficiency, A law & μ law companding, Bandwidth of PCM, Block diagram of PCM system, Delta Modulation, Continuously variable Slope Delta Modulator (CVSDM) or Adaptive Delta Modulation, Differential Pulse Code Modulation, Intersymbol Interference, Eye Patterns, Signal power in binary digital signals.

Digital Carrier Line Encoding & Multiplexing Techniques: Line Coding & its properties. NRZ & RZ types, signalling format for unipolar, Polar, bipolar (AMI) & Manchester coding and their power spectra (No derivation), HDB and B8ZS signalling, Fundamentals of time division multiplexing, T1 Digital Carrier system, Synchronization and Signaling of T1, TDM, PCM hierarchy, North-American Digital Hierarchy; T1 to T4 PCM TDM system (DS1 to DS4 signals), Bit versus word interleaving, Statistical TDM, Codecs & Combo Chips

Digital Carrier Modulation & Demodulation Techniques: Introduction, Information capacity, Shannon Limit for Information capacity, Bit Rate, Baud & M-Ary Encoding, Amplitude Shift Keying (ASK), ASK Spectrum, ASK Modulator, Coherent ASK Detector, Noncoherent ASK Detector, Frequency Shift Keying (FSK), FSK Bit Rate and Baud, Bandwidth and Frequency Spectrum of FSK, FSK Transmitter, Non-coherent FSK Detector, Coherent FSK Detector, FSK Detection Using PLL, Binary Phase Shift Keying, Binary PSK Spectrum, BPSK Transmitter, Coherent PSK Detection, Quadrature Phase Shift Keying (QPSK), QPSK Demodulator, Offset QPSK, p/4 QPSK, Comparison of conventional QPSK, Offset QPSK and p/4 QPSK, M-Ary BPSK e.g. 8 PSK & 16 PSK, Quadrature Amplitude Modulation (QAM); 8 QAM & 16 QAM transmitters and receivers, Band Width efficiency, Carrier Recovery; Squaring Loop & Costas Loop, Differential PSK, DBPSK transmitter and receiver, Constant Envelop Modulation; Minimum Shift Keying (MSK) & Gaussian Minimum Shift Keying
(GMSK) Simulation of above systems using ComSim and Matlab
.

Text Books:

1. Communication Systems, Fourth Edition, Simon Haykin, Wiley publication.
2. Electronic Communication Systems, Tomasi, 4th edition, Pearson Publications.

Reference Books:

1. Modern Electronic Communication, (6th edition), by Gary M. Miller, published by Prentice-Hall, 1999
2. Introduction to Communication Systems, third edition, by F. G. Stremler Addison-Wesley, 1990.
3. Digital Communication, E.A. Lee and D.G. Messerschmitt, , Kluwer Academic Publishers,1994
4. Digital Communication Receivers, H. Meyr, M. Moeneclaey, S.A. Fechtel, Wiley, 1998
5. Digital Communications/Mc Graw Hill 2nd Ed, ProakisJ.J.

5.6 Elective I

1. Bio Medical Electronics

Transducers and Electrodes: Different type of transducer and their selection for Biomedical applications; Inductive, capacitive, piezoelectric transducers, Thermistors: Radiation & Chemical thermometry; Electrode theory and Different types of Electrodes. Polarization, Electrode behaviour, Electrode-skin interface.

Origin of Bio-potentials: Electric activity of excitable cells, Neuron resting potential, Nerst equation : ECG, EEG, EMG, source of these potentials, generation of signals, recording.

Cardio Vascular Measurement: Measurement of blood pressure, balloon flow, cardiac output and cardiac rate.

Respiratory System Measurements: Respiratory mechanism; Measurement of gas volume, flow rate, carbon dioxide and oxygen concentration in exhaled air, respiration controller.

Medical Imaging Systems: Radiography, CAT scan, Ultrasonic scanning and nuclear medicine, principles and applications, Angio graphy, flour scopy.

Bio-effects of Microwaves: Interaction of microwaves with biological systems. Diathermy, Biological Hazards of microwaves as well as low

Therapeutic and Prosthetic Devices: Cardiac pacemakers, electrical stimulators,Defibrill'ors and cardioverters Heamodialysis, Ventilators.

Electrical Safety: Physiological effects of electricity, Micro shock and Macro shock hazards; Electrical safety standards Basic approaches to shock protection.

Text Books:

1. Medical Instrumentation : Application & Design - John G. Webster, Houghton Miffin & Co., Boston, 1978.

2 Biomedical Instrumentation - Marvin D. Wwirs, Chilton Book Co., London, 1973.

2. Image Processing

1 Introduction to Electronic Image Processing: historical background, visual perception, image formation, sampling & Quantization & application of image Processing.
2. **Transforms used in Electronic Image Processing**: Review of 1-D & 2-D Fourier Transforms, Discrete Fourier transforms & other image transforms.
3. **Image Enhancement by Point operation**: An overview of point Processing, constant & non-linear operations between image & histogram techniques.
4. **Spatial Filtering & Fourier frequency Method**: Noise in image, Spatial & Special frequency filtering, image restoration.
5. **Non-Linear image processing techniques**: Non-linear Spatial/Mean/Adaptive & Homomorphic Filters
6. **Color Image Processing**: Color Models, examples of color image processing, Pseudocoloring & color displays.
7. **Image segmentation & Representation**: Image Thresh-holding, Edge/Line &Point direction, Region based segmentation & Image representation.
8. Introduction to Morphological filters & Image Compression

Text Books:

1. Fundamentals of electronic image processing by Arthur R. Weeks, Jr., Eastern Economy Edition 2003, SPIE Press, Prentice hall of India New Delhi.

Reference Books:

1. Digital Image Processing by Rafael C. Gonzale & Richard E. Woods, Pearson Education Asia(2nd edition 2002)
2. Fundamentals of digital image processing by A.K.Jain, 1989, Prentice Hall Englewood Cliffs, N.J.

3. Satellite Communication

Introduction: Origin of Satellite Communication, Current state of Satellite Communication, Advantages of Satellite Communication, Active & Passive satellite, Orbital aspects of Satellite Communication, System Performance.

Communication Satellite Link Design - Introduction, general link design equation, system noise temperature, C/N & G/T ratio, atmospheric & econospheric effects on link design, complete link design, interference effects on complete link design, earth station parameters.

Satellite analog & digital communication Baseband analog(voice) signal,FDMA techniques, S/N ration, SCPC & CSSB systems, digital baseband signals & modulation techniques.

Multiple Access Techniques TDMA frame structure, burst structure, frame efficiency, superframe, frame acquisition & synchronization, TDMA vs FDMA, burst time plan, beam hopping, satellite switched, Erlang call congestion formula, demand assignment ctrl, DA-FDMA system, DATDMA.

Laser & Satellite Communication Link analysis, optical satellite link Tx & Rx, Satellite, beam acquisition, tracking & pointing, cable chaanel frequency, head end equation, distribution of signal, n/w specifications and architecture, optical fibre CATV system.

Satellite Applications Satellite TV, telephone services via satellite, data Communication services, satellites for earth observation, weather forecast, military appliances, scientific studies.

Text Books

1. Timothy Pratt “Satellite Communication “
2. D.C Aggarwal “Satellite Communication”

5.7 LINEAR CONTROL SYSTEMS LABORTOARY

To perform exercises related to the following using Control System Toolbox by writing computer programs and functions in MATLAB:

• Time and Frequency response of control systems

• Plotting of Bode, Nyquist and Root Loci diagrams.

• Design of Control Systems using MATLAB and SIMULINK

5.8 OBJECT ORIENTED PROGRAMMING USING C++ LABORTOARY

List of experiments:

To write following programs in C / C++ :

1. Using basic statements like control statements , looping statements, various I/O statements and various data structures.
2. Creating classes in C++ for understanding of basic OOPS features.
3. Representing concepts of data hiding, function overloading and operator overloading.
4. Using memory management features and various constructors and destructors.
5. Representing Inheritance, virtual classes and polymorphism.
6. Writing generic functions.
7. File handling programs.

5.9 DIGITAL COMMUNICATION SYSTEM LABORTOARY

LIST OF EXPERIMENTS

1. Study of Time Division Multiplexing system.
2. Study of pulse code modulation and demodulation.
3. Study of delta modulation and demodulation and observe effect of slope overload.
4. Study pulse data coding techniques for various formats.
5. Data decoding techniques for various formats.
6. Study of amplitude shift keying modulator and demodulator.
7. Study of frequency shift keying modulator and demodulator.
8. Study of phase shift keying modulator and demodulator.
9. Error Detection & Correction using Hamming Code
10. Digital link simulation; error introduction & error estimation in a digital link using MATLAB (SIMULINK)/ComSim.

F. SIXTH SEMESTER

6.1. COMPUTER ORANISATION & ARCHITECTURE

1. Harware Requirement and Micro Operations

   Philosophy of digital system and computer design, review of digital hardware and MSI/LSI/VLSI devices decription and applications. Register transfer and micro operations: arithmetic, logic and shift micro-operations, simple computer design.

2. System Software and Peripheral Devices

   Assembly language, the Assembler, introduction to complier, important peripheral devices, PC family.

3. Processor Design

   Processor organization, arithmetic and logic unit, design of arithmetic and logic unit, design of accumulator, introduction to parallel computing- pipeline processing.

4. Logic Control Design

   Processor organization , hardware control, micro program control, control of processor unit, hardware and PLA controller, micro program sequencer.

5. Computer Design, I/O & Memory Organization

   Design aspects related to: systems configuration, computer instruction set, timing and control, instruction execution, design of Control (PLA & microprogram) computer control. Review of I/O Interface and data transfers, review of various memories: bulk magnetic stirage, auxiliary memory hierarchy, associative, virtual and cache memories, memory management hardware.

Books:

1. M.Morris Mano " Computer System architecture ", 2nd Edition, PHI Ltd 1982
2. M. Morris Mano " Computer Engineering Hardware ", Prentice Hall International. 1988.
3. M. Morris Mano " Digital Logic and Computer Design ", PHI Ltd 1979
4. Hayes " Computer Architecture " Mc Graw Hill
5. Hanancher " Computer Organisation " Pretice Hall.

6.2 DIGITAL SIGNAL PROCESSING

Fourier analysis of discrete-time signals and systems: Discrete Fourier Series, Discrete Time Fourier Transform, Discrete Fourier Transform - Properties; Approximation of Fourier transform through DFT, Fast algorithms for DFT: The FFT algorithm - Prime factor algorithms, Convolution; Linear and circular convolution, Practical computation, Overlap save and overlap add methods, Short time Fourier transform.

Digital filters: FIR Filters: Impulse response, Transfer function, Linear phase properties, Design: window based design, frequency sampling design, minimax design. IIR Filters: Impulse response, Transfer function, Pole-zero representation; Butterworth, Chebyshev, inverse Chebyshev and elliptic filter concepts, Approximation problem for IIR filter design: Impulse in variance method, Bilinear transform method, Matched z-transform method, Minimum mean squared error method; Frequency transformations.

Least squares filter design: Deterministic least squares: whitening problem: FIR case; Signal modelling: Spectral factorization Statistical least squares: Non-causal case, FIR case, Causal IIR case, Adaptive filtering: concepts and algorithms

(a) Internal descriptions of digital filters: Signal flow graphs, State variable descriptions, State variable descriptions from primitive signal flow graphs, Transfer function from state variable descriptions, difference equation from state variable description, Co-ordinate transformation, Poles, zeros and the state variable description.

(b) Finite length register effects: Limit cycles, overflow oscillations, state variable model for overflow, round-off noise in IIR digital filters, computational output roundoff noise, methods to prevent overflow, scaling rules, and scaling operations, scaling state variable description, trade off between round off and overflow noise, measurement of coefficient quantization effects through pole-zero movement, dead band effects, constant input limit cycles.

Text Books:-

1. *Boaz Porat, A course in Digital Signal Processing, Prentice Hall Inc.*
2. *Mitra S. K., Digital Signal Processing : A Computer Based Approach, McGraw-Hill Publishing*
3. *Richard A. Roberts, Cli_ord T. Mullis, Digital Signal Processing, Addison-Wesley Publishing Co*

Reference books:-

1. *Oppenheim A. V., Schafer R. W., Discrete-Time Signal Processing, PHI*
2. *Chi-Tsong Chen, Digital Signal Processing: Spectral Computation and Filter Design, OUP*
3. *John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, PHI*
4. *Lonnie C. Ludeman, Fundamentals of Digital Signal Processing, John Wiley & Sons*

6.3 MICROCONTROLLER & EMBEDDED SYSTEM

Introduction: 8051 Micro controller: Comparison of Microprocessor and Micro controller, micro controller and embedded processors, overview of 8085 families.8051 Assembly Language Programming: Introduction to 8051 Assembly programming, Assembling and running an 8051 program. Data Types and directives.8051 flag bits and PSW register. Register banks and stack.

Jump loop and call instructions, I/O Port programming: Addressing modes and accessing memory using various addressing modes. Arithmetic instructions and programs, Logic instructions and programs, Single bit instructions and programming, Timer/counter programming **in the 8051** Serial Communication: **8051 connection to RS 232, 8051 serial communication programming.**

Real World Interfacing: LCD, ADC and sensors, Stepper motor, keyboard, DAC and external memory

Introduction to an embedded system and its design: Introduction to ES& its applications, design parameters of an ES and its significance (With respect to all parameter), present trends in ES, Embedded System design life cycle, product specifications and hardware, software partitioning, Codesign.

Introduction to latest micro controllers such as ARM processors and its applications.

Text Books:

1. *Ali Mazidi, The 8051 Microocntroller and embedded Systems*
2. *David e Simon, Am embedded software primer, PE*
3. *Frank vahid and Tony Givargus, Embedded system design*

6.4 MICROWAVE AND RADAR ENGINEERING

Microwave Tubes: Limitations of conventional tubes, construction, operation and properties of Klystron Amplifier, reflex Klystron, Magnetron, TWT, BWO, Crossed field amplifiers.

Microwave Solid State Devices: Limitation of conventional solid state devices at MW, Transistors(Bipolar, FET) , Diodes(Tunnel, Varactor, PIN), Transferred Electron Devices(Gunn diode), Avalanche transit time effect (IMPATT, TRAPATT, SBD)

Microwave Components: Analysis of MW components using s-parameters, Junctions (E,H, Hybrid), Directional coupler, Bends and Corners, MW posts, S.S. tuners, Attenuaters, Phase shifter, Ferrite devices(Isolator, Circulator, Gyrator), Cavity resonator, Matched termination.

Microwave Measurements: Power measurements using calorimeters and bolometers, Measurement of SWR, Frequency and wavelength, Microwave bridges.

Introduction to Radar Systems: *Basic Principle:* Block diagram and operation of Radar,Radar range Equation, PRFs and Range Ambiguities, Applications of Radar.

Doppler Radars: Doppler determination of velocity, CW radar and its limitations, FMCW radar, Basic principle and operation of MTI radar, Delay line cancellers, Blind speeds and staggered PRFs.

Scanning and Tracking Techniques: Various scanning techniques(Horizontal, vertical, spiral, palmer, raster, nodding), Angle tracking systems(Lobe switching, conical scan, monopulse), Range tracking systems, Doppler(velocity)tracking systems.

Text books:

1. Microwave devices and circuits: Samuel Liao;PHI
2. Microwave devices and radar engg: M.Kulkarni;Umesh Publications
3. Introduction to radar systems: Merill I. Skolnik

Reference Books:

1. Foundation of Microwave Engg : R.E.Collin;McGraw Hill
2. Microwave Engg: K.C Gupta

6.5 COMPUTER NETWORKS

Data communication concepts: Digital & Analog, Parallel & serial,Synchronous & Asynchronous, Simplex, Half duplex & Full duplex.

Computer Networks: Introduction, N/W Topology, Wired N/W Vs wireless N/W. Classification of computer N/W's- LAN, MAN, WAN. Internet,Intranet & Extranet.

Protocols & Protocol suits (eg TCP/IP, IPX/SPX), Need of Protocols & their significance in Networking.

N/W Reference Models:- OSI reference Model, TCP/IP reference Model, comparison of OSI & TCP/IP Ref Models.

Networking H/W: Ethernet cabling, The NIC, Repeater, Router, Bridges, Switches, Transcievers, hubs, Cable Modems. Comminication Switching Techniques:

Circuit Switching, Packet Switching & Message switching.

LAN standards (IEEE 802 PROJECT): Ethernet, CSMA/CD, Token Ring, Token Bus, & their frame formats. FDDI.

Data link & N/W layer Services provided to N/W layer, Framing, Data link control: Flow control, Error Detection, HDLC & SDLC, concept of Routing & congesition control.

Transport layer Transport layer Protocols like TCP, UDP, connection Oriented Transport Protocol, TCP services.

N/W Protocols: Low level Protocols. SLIP, PPP NETBEUI, High level Protocols:- IP & IP Addresses, ARP,RARP

Traditional Application: Terminal Acess:Telnet, File transfer: FTP, Email: SMTP & MIME & POP3

Modern Applications: Web Applications :- HTTP. Internet and its Applications

Unix Networking concepts: Introduction to sockets.

References Books:

1. William Stallings "Computer Networking with Internet Protocols And Technology", Pearson Education.
2. Keneth C. Mansfield, Jr. James L. Antonakos "An Introduction to Computer Networking", PHI.

6.6 INDUSTRIAL ELECTRONICS

Characteristics of Selected Devices: Fast recovery diodes, Schottky diode, SCR, gate trigger and commutation circuits, series and parallel connection of SCRs, Diac, Triac, UJT, Power MOSFETs.

Controlled Rectifier: Half wave and full wave with resistive & R-L-E and resistive-inductive loads. Free-wheeling diode, three phase rectifiers, Bridge rectifiers -half controlled and fully controlled.

Inverter, Chopper And Cycloconverter : Voltage driven, current driven, bridge, parallel, SCR versions, control of output voltage-PWM schemes, harmonic reduction Motor Control: D.C. and A.C. motor control, reversible drives, closed loop control, commutatorless d.c. motor control.

A.C. Voltage Controllers: Types of AC Voltage Controllers, Integral cycle control, single phase voltage controller, Sequence control of AC voltage (Transformer tap changers)

Books:

1. Power Electronics - P.C. Sen, Tata McGraw Hill Publishing Co., Ltd., 1987.
2. Power Electronics and Control - S.K. Dutta, Prentice Hall of India Pvt. Ltd., 1986.

6.7 DIGITAL SIGNAL PROCESSING USING MAT LAB

List of experiments:

Perform the following exercises using MATLAB

1. To develop elementary signal function modules (m-files) for unit sample, unit step, Exponential and unit ramp sequences.
2. To develop program modules based on operation on sequences like signal shifting, signal folding, signal addition and signal multiplication.
3. To develop program for discrete convolution and correlation.
4. To develop program for finding response of the LTI system described by the difference equation.
5. To develop program for computing inverse Z-transform.
6. To develop program for finding magnitude and phase response of LTI system described by system function H(z).
7. To develop program for computing DFT and IDFT .
8. To develop program for computing circular convolution.
9. To develop program for conversion of direct form realisation to cascade form realisation.
10. To develop program for cascade realisation of IIR and FIR filters.
11. To develop program for designing FIR filter.
12. To develop program for designing IIR filter.

Text Book:

1. DSP using Matlab : Ingle V.K., Proakis ; Vikas Publication.

6.8 MICROWAVE RADAR & ENGINEERING LABORTOARY

List of Experiments:

1. Study of microwave components and instruments.
2. Measurement of crystal characteristics and proof of the square law characteristics of the diode.
3. Measurement of klystron characteristics. 4. Measurement of VSWR and standing wave ratio.
4. Measurement of Dielectric constants.
5. Measurement of Directivity and coupling coefficient of a directional coupler.
6. Measurement of Q of a cavity.
7. Calibration of the attenuation constant of an attenuator.
8. Determination of the radiation characteristics and gain of an antenna.
9. Determination of the phase-shift of a phase shifter.
10. Determination of the standing wave pattern on a transmission line and finding the length and position of the short circuited stub.

6.9 MICROCONTROLLER & EMBEDDED SYSTEM LABORTOARY

List of Experiments:

1. Study of 8051/8031 Micro controller kits.
2. Write a program to add two numbers lying at two memory locations and display the result.
3. Write a program for multiplication of two numbers lying at memory location and display the result.
4. Write a program to check a number for being ODD or EVEN and show the result on display.
5. Write a program to split a byte in two nibbles and show the two nibbles on display.
6. Write a Program to arrange 10 numbers stored in memory location in Ascending and Descending order.
7. Write a program to find a factorial of a given number.
8. Study of Interrupt structure of 8051/8031 micro controllers.

9. Write a program to show the use of INT0 and INT1.

10. Write a program of Flashing LED connected to port 1 of the Micro Controller

11. Write a program to generate a Ramp waveform using DAC with micro controller.

12. Write a program to interface the ADC.

13. Write a program to control a stepper motor in direction, speed and number of steps.

14. Write a program to control the speed of DC motor.

15. Interfacing of high power devices to Micro-controller port-lines, LED, relays and LCD display.

6.10 INDUSTRIAL ELECTRONICS LABORTOARY

List of experiments

1. To draw the characteristics of SCR.

2. To draw the characteristics of DIAC.

3. To draw the characteristics of TRIAC.

4. To vary the speed of a dc motor with the help of an SCR.

5. To determine the ripple factor of a full wave rectifier using SCR for various firing angles.

6. To control the firing angle of thyristor by varying

i) dc bias alone

ii) dc bias with superimposed ac.

7. To vary the firing angle of an SCR using a phase shift circuit and a peaking transformer.

8. To vary the frequency of an inverter circuit

9. To determine frequency of a relaxation oscillator for various values of C.

10. To obtain the average current of an SCR as a function of resistance.

G. SEVENTH/ EIGTH SEMESTER

8 .1 WIRLESS COMMUNICATION SYSTEM

Introduction: Mobile Radio Systems around the world, Examples of Wireless Communication Systems; Paging Systems, Cordless Telephone Systems, Cellular Telephone Systems, Comparison of common Wireless Communication systems

Digital Communication through fading multipath channels: Fading channel and their characterstics- Channel modelling, Digital signalling over a frequency non selective slowly fading channel- frequency selective slowly fading channel- Calculation of error probabilities- Tapped Delay line model- The RAKE demodulator- performance-Concept of diversity branches and signal paths- Combining methods- Selective diversity combining-pre-detection and post-detection combining- Switched combining- maximal ratio combining- Equal gain combining.

Multiple Access Techniques for Wireless Communications: Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, Space Division Multiple Access, Packet Radio Protocols; Pure ALOHA, Sloted ALLOHA, Capacity of Cellular Systems

Wireless Networking: Introduction, Difference between Wireless & Fixed Telephone Networks, Development of Wireless Networks, Traffic Routing in Wireless Networks, Wireless Data Services, Common Channel signaling, Broad band ISDN & ATM, Signaling System No. 7(SS-7), Personal Communication Services/ Networks, Protocols for Network Access, Network Databases.

Wireless Systems & Standards: AMPS and ETACS, United states digital cellular (IS-54 & IS 136), Global system for Mobile (GSM); Services, Features, System Architecture, and Channel Types, Frame Structure for GSM, Speech Processing in GSM, CDMA Digital standard (IS 95); Frquency and Channel specifications, Forward CDMA Channel, Reverse CDMA Channel, CT2 Standard for Cordless Telephones, Personal Access Communication System, Pacific Digital Cellular, Personal Handyphone Systems, PCS and ISM Bands, Wireless Cable Television.

Wireless Local Area Networks (WLAN): Components and working of WLAN, transmission media for WLAN, Modulation techniques for WLAN (DSSS, FHSS), IEEE 802.11 standards and protocols for WLAN (MACA, MACAW). Mobile Network and Transport layer: Mobile IP, Mobile TCP, traffic routing in wireless networks, wire less ATM. Wireless Local Loop(WLL) : WLL Architecture, WLL Technologies and frequency spectrum.

Future trends: Blue Tooth technology, 4G mobile techniques, Wi-Fi Technology.

Text Books:

1. Theodore S.Rappaport, “Wireless communications:Principles and practice”, third Indian reprint Pearson Education Asia 2003.
2. Raj Pandya, “Mobile and Personal Communication systems and services”, Prentice Hall of India, 2001.

8 .2 OPTICAL FIBER COMMUNICATIONS

Introduction: Need of Fiber Optic Communications, Evolution of Light wave Systems, Basic Concepts; Analog & Digital Signals, Channel Multiplexing, Modulation Formats, Optical Communication Systems, Light wave System Components; Optical Fibers as a Communication Channel, Optical Transmitters, Optical Receivers.

2. Optical Fibers: Geometrical-Optics Description; Step-Index Fibers, Graded Index Fibers, Wave Propagation; Maxwell's Equations, Fiber Modes, Single-Mode-Fibers, Dispersion in Single-Mode Fibers; Group Velocity Dispersion, Material Dispersion, Wave guide Dispersion, Higher-order Dispersion, Polarization-Mode Dispersion, Dispersion-Induced Limitations; Basic Propagation Equation, Chirped Gaussian Pulses, Limitations on the Bit Rate, Fiber Bandwidth , Fiber Losses; Attenuation Coefficient, Material Absorption, Rayleigh Scattering, wave guide Imperfections,
Nonlinear Optical effects; Stimulated Light Scattering, Nonlinear Phase Modulation, Four Wave Mixing, Fiber Manufacturing; Design Issues, Fabrication Methods, Cables and Connectors

Optical Transmitters: Basic Concepts; Emission and Absorption Rates, p-n Junctions, Non radiative Recombination, Semi conductor Materials, Light Emitting Diodes; Power-current Characteristics, LED spectrum, Modulation Response, LED Structures, Semi Conductor Lasers; DFB Lasers, Coupled Cavity semiconductor Lasers, Tunable Semiconductor Lasers, Vertical Cavity Semiconductor Lasers, Laser Characteristics, Small & Large Signal Modulation, Spectral Line width, Source Fiber Coupling.

Optical Receivers: Basic concepts, p-n Photo Diodes, p-i-n Photo Diodes, Avalanche Photo Diode, MSM Photo detector, Receiver Design, Receiver Noise; Noise mechanism, Receiver sensitivity; Bit error rate, Minimum Receiver Power, Sensitivity Degradation, Receiver Performance.

Light Wave Systems: System Architecture, Loss limited Light wave systems, Dispersion limited Light wave systems, Power Budget, Long Haul systems, Sources of Power Penalty; Model Noise, Dispersive Pulse Broadening, Mode Partition Noise, Frequency Chirping, Reflection Feedback Noise.

Multi channel Systems: WDM Light wave systems, Optical TDM Systems, Subscriber Multiplexing, Code Division Multiplexing.

Text Books:

1. Govind P. Agrawal, Fiber Optics Communication Systems John Wiley & Sons (Asia) Pte Ltd.
2. Senior J. Optical Fiber Communications, Principles & Practice, PHI.
3. Keiser G., Optical Fiber Communication Mc graw-hill.

8 .3 VLSI DESIGN & TECHNOLOGY

Introduction: Introduction to Computer-aided design tools for digital systems. Hardware description languages, Introduction to VHDL, Data objects, Classes and data types, Operators, Overloading, Logical operators. Types of delays, Entity and Architecture declaration. Introduction to behavioural, dataflow and structural models.

VHDL Statements: Assignment statements, sequential Statements and process,
Conditional statements, Case statements, Array and loops, Resolution functions, Packages & Libraries, Concurrent statements.

Combinational Circuit Design: VHDL models and simulation of combinational circuits such as Multiplexers, Encoders, Decoders, Code converters, Comparators, Implementation of Boolean functions etc.

Sequential Circuit Design: VHDL Models and simulation of sequential circuits, Shift registers, Counters etc.

Design of Microcomputer: Basic components of a computer, Specifications, Architecture of a simple Microcomputer system, Implementation of a simple microcomputer system using VHDL.

Design with CPLDs and FPGAs: Programmable logic devices : ROM, PLAs, GAL, PEEL, CPLDs and FPGA. Design and implementation using CPLDs and FPGAs

Text Books:

1. IEEE Standard VHDL Language reference Manual(1993)
2. Digital Design & Modelling with VHDL & Synthesis : KC Chang; IEEE Computer Society Press.
3. “A VHDL Primmer”: Bhasker; Prentice Hall 1995
4. “Digital System Design using VHDL”:Charles. H. Roth; PWS(1998)
5. “VDHL-Analysis & Modelling of Digital Systems”: Navabi Z; McGraw Hill
6. VHDL-IV Edition:Perry; TMH(2002)
7. “Introduction to Digital Systems”: Ercegovac. Lang & Moreno; John wiley(1999)
8. Fundamentals of Digital Logic with VHDL Design: Brown and Vranesic; TMH(2000)
9. Modern Digital Electronics-III Edition : R.P Jain; TMH(2003)

8.4 Elective II

1. Television Engineering

General Introduction Sound and picture transmission, Sound and picture reception, picture elements, frame and field frequencies, scanning process, interlaced scanning ,resolution- vertical resolution, horizontal resolution ,video bandwidth, receiver controls.

Composite video signals and TV standards Construction of composite signal, Horizontal & vertical sync details, scanning sequence details, functions of composite video signal.

Picture carrier signal transmission Negative transmission, vestigial side-band channel allocations, T.V. studio / control room.

Television Camera and Picture Tube Camera lenses, T. V. camera tubes- Image orthicon, vidicon, plumbicon, comparison of various T.V. camera tubes, monochrome picture tube- principle of operation and characteristics.

Broadcast Television receivers Design specifications for T.V. receiver in India, R. F. tuner, Block diagram of V.H.F tuner, types of tuners, transistor tuners, video I.F. amplifier, synchronisation and staggered tuning, inter stage coupling methods, types of trap circuits, transistor video I.F. amplifier circuits , video detector, D.C. component restoration, sound I.F. take off, video amplifier requirements, low frequency compensation, H. F. compensation ,A G.C- its types, and E.H.T. generation, synchronising circuits and control oscillators, horizontal deflection circuits, vertical deflection circuits, alignment of monochrome and colour T.V. receivers.

Colour Television Colour fundamentals, mixing of colours and colour reception, chromaticity diagram, colour picture tubes and its types, colour T.V. transmission and reception-frequency interleaving, modulation of colour difference signals, colour burst signal, weighting factors.

Text Books:

1. Television Engg. - By Dhake Arvind, M. Tata McGraw hill
2. Television simplified - Milton S. Kilver
3. Basic Television Principles and servicing - Bernard Grob. McGraw Hill
4. Principles of Television Engg. - Fink. McGraw Hill
5. Principles of Monochrome of colour television - R. R. Gula

2. Cellular Mobile Communication

Introduction To Wireless Communication Systems:

Evolution of mobile radio communications, examples of wireless comm. systems, paging systems, Cordless telephone systems, comparison of various wireless systems.

Modern Wireless Communication Systems:

Second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Blue tooth and Personal Area networks.

Introduction To Cellular Mobile Systems:

Spectrum Allocation, basic Cellular Systems, performance Criteria, Operation of cellular systems, analog cellular systems, digital Cellular Systems.

Ellular System Design Fundamentals:

Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and grade off service, improving coverage and capacity.

Multiple Access Techniques For Wireless Communication:

Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access, packet ratio, capacity of a cellular systems.

Wireless Networking:

Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in wireless networks, wireless data services, common channel signaling, ISDN (Integrated Services digital Networks), advanced intelligent networks.

Intelligent cell concept and application:

Intelligent cell concept, applications of intelligent micro-cell Systems, in-Building Communication, CDMA cellular Radio Networks.

Text Books:

1. Wireless Communications: Theodore S. Rappaport; Pearsons.
2. Mobile Cellular Telecommunication: W.C.Y.Lee; McGraw Hill

Reference Book:

1. Mobile Communications: Jochen Schiller; Pearson

3.DATABASE MANAGEMENT SYSTEM

Part – 1 Basic Concepts

Databases And Database Users: -
Introduction, Characteristics of Database Approach, Advantages And isadvantages of Using DBMS.

Database System Concepts And Architecture:-
Data Models, Schemas And Instances, DBMS Architecture And Data Independence, Database Language And Interfaces, Classification of Database Management Systems. (L-3)

Data Modeling Using The Entity Relationship Model:-
Entity Types, Entity Sets, Attributes And Keys, Relationships, Relationship Types, Roles, And Structural Constrains, Weak Entity Types, ER Diagrams, Naming Conventions And Design Issues.

Part – 2 Relational Model, Language And Systems

The Relational Data Model, Relational Constrains, The Relational Algebra and Relational Calculus:-
Relational Model Concepts, Relational Constraints And Relational Database Schema, Update Operations And Dealing With Constraint Violations, Basic Relational Algebra Operations, Example of Queries in Relational Algebra, The Tupple Relational Calculus, The Domain Relational Calculus.

SQL Relational Database Standard:-
Basic queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Views in SQL, Additional Features of SQL.

Part – 3 Database Design Theory and Methodology

Functional Dependencies and Normalization for elational
Databases:-
Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms.

Part – 4 System Implementation Techniques Transaction Processing Concepts:-
Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Schedules and Recoverability, Serializability of Schedules.

Concurrency Control Techniques:-

Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Validation Concurrency Control Techniques, Granularity of Data Items and Multiple Granularity Locking.

Database Recovery Techniques:-

Recovery Concepts, Recovery Techniques Based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging

Database Security and Authorization:-

Introduction to Database Security Issues, Discretionary Access Control Based on Granting/Revoking of Privileges, Introduction to Statistical Database Security.

Text Books :

1. Fundamentals of Database Systems, Third Edition, by Elmasri/Navathe
2. Korth and Silberschatz Abraham, Database Concepts, McGraw Hall,1991
3. An introduction to Database Systems by C.J.Date.

References :

1. An introduction to Database Systems by Bipin C. Desai.

2. SQL,PL/SQL ,The programming language of oracle, Ivan Bayross BPB Publication

4. Neural Network and Fuzzy Logic

Neural Networks characteristics: History of development in neural Networks Principles, Artificial Neural Net terminology, Model of a neuron, topology, learning types of learning supervised unsupervised, re-inforcement learning.
Basic Hopfield Model: the perceptron, linear separability, Basic learning laws : Hebb's rule, Delta rule, Widrow & Hoff LMS learning rule, correlation learning rule, instar and outstar learning rules.
Unsupervised learning: competitive learning, K-means clustering algorethm, Kohonen's feature maps.
Radial Basis: Function neural networks, basic learning Laws in RBF nets, Recurrent networks, recurrent back propagation, Real Time Recurrent learning algorithm. Introduction to counter Propagation networks, CMAC networks, ART networks.
Applications of neural nets such as pattern recoginition: optimization, associative memories, vector quantization, control,Applications in speech and decision making.
Fuzzy Logic : Basic concepts of Fuzzy Logic, Fuzzy vs Crisp set, Linguistic variables, membership functions, operations of fuzzy sets, fuzzy IF-THEN rules, variable inference, techniques, defuzzication techniques, basic fuzzy inference algorithm, Applications of fuzzy logic, Fuzzy system design, Implementation of fuzzy system, Useful tools supporting design.
Text Books:
1. Fuzzy Systems Design Principles, Building Fuzzy IF-THEN Rule Bases By Riza C. Berkin & Trubatch, JeeeBcss
2. Vegna Narayanan - Artificial Neural Networks
3. Bart Kosko - Neural Networks & Fuzzy Logic
4. Simon Haykin - Neural Networks

8 .5 TOTAL QUALITY MANAGEMENT

Detailed Contents

1. Quality and Total Quality Management; Excellence im manufacturing/service, factors of excellence, relevance of TQM.
2. Concept and definition of quality; total quality control (TQC) and Total Quality Management (TQM), salient features of TQC and TQM. Total Quality Management Models, benefits of TQM.
3. Just-in-time (JIT): Definition: Elements, benefits, equipment layout for JIT system, Kanban system MRP (Material Requirement planning) vs JIT system, Waste elimination, workers involvement through JIT: JIT cause and effect chain, JIT implementation.
4. Customer: Satisfaction, data collection and complaint, redressal mechanism.
5. Planning Process: Policy development and implementation; plan formulation and implementation.
6. Process Management: Factors affecting process management, Quality function development (QFD), and quality assurance system.
7. Total Employees Involvement (TEI): Empowering employees: team building; quality circles; reward and Recognition; education and training, Suggestion schemes.
8. Problems solving Defining problem; Problem identification and solving process; QC tools.
9. Benchmarking definition, concept, process and types of benchmarking.
10. Quality Systems: Concept of quality system standards: relevance and origin of ISO 9000; Benefits; Elements of ISO 9001, ISO 9002, ISO 9003.
11. Advanced techniques of TQM: Design of experiments: failure mode effect analysis: Taguchi methods

BOOKS:

1. Total Quality Management by sunder Raju, Tata Mcgraw Hill
2. TQM for engineers by M.Zairi, Aditya Books
3. Total Quality Management Handbook by J.L. Hradeskym MCGraw Hill
4. ISO 9000 quality System by Dalela and Saurabh, standard Publishers

8 .6 VLSI DESIGN LABORTOARY

Combinational Design Exercises

1. Design of Gates
    a. Design of AND gate
    b. Design of OR gate
    c. Design of XOR gate
2. Design of XOR gate using other basic gates
3. Design of 2:1 Mux using other basic gates
4. Design of 2 to 4 Decoder
5. Design of Half-Adder, Full Adder, Half Substractor, Full Substractor
6. Design of 3:8 Decodre
7. Design of 8:3 Priority Encoder
8. Design of 4 Bit Binary to Grey code Converter
9. Design of 4 Bit Binary to BCD Converter using sequential statement
10. Design an 8 Bit parity generator (with for loop and Generic statements)
11. Design of 2,s Complementer for 8-bit Binary number using Generate statements

Sequential Design Exercises

12. Design of all type of Flip-Flops using (if-then-else) Sequential Constructs
13. Design of 8-Bit Shift Register with shift Right, Rhisft Left, Load and Synchronous reset.
14. Design of Synchronous 8-bit Johnson Counter.
15. Design of Synchronous 8-Bit universal shift register (parallel-in, parallel-out) with 3- state output (IC 74299)
16. Design of 4 Bit Binary to BCD Converter using sequential statement.
17. Design
    a. Mod 3 Counter
    b. Mod 5 Counter
    c. Mod 7 Counter
    d. Mod 8 Counter
    e. Mod 16 counter
    f. 4 Bit Johnson counter
18. Design a decimal up/down counter that counts up from 00 to 99 or down from 99 to 00.
19. Design 3-line to 8-line decoder with address latch
20. Design of ALU

8 .7 Major Project

Major Project is meant for solving live problems faced by the current industries by applying the knowledge and skills gained by students in the 3 years. Students may be asked to identify the problem of project in consultation with a teacher in the second year(well in advance). Each project should be taken by 4 to 5 students. While the students are executing the projects teacher will monitor the progress of students by paying regular visit to the industries. The students will submit comprehensive project report with a fabricated model / instruments/ circuits for evaluation by the teacher guide, experts from industry and external examiner. Some of the suggested projects are :

1. Projects related to design, fabrication, testing and trouble shooting of medical, electronic equipment
2. Software projects related to electronic field. \projects related to microprocessor based circuits of the instruments.
3. Projects related to design, fabrication, testing and application of simple digital circuit and component
4. Projects related to design of small oscillators and amplifiers circuits.
5. Projects related to suggesting substitute of electronics components being used.
6. Projects related to design of PCBS.
7. Projects connected with repair and maintenance of instrument , plant and equipment
8. Projects related to estimation and economics.
9. Projects related to quality insurance
10. Projects related increasing productivity
11. Projects related to designing small electronic equipment/ instrument
12. Any other project student may like to undertake ,which is of desired standard and related to his field of interest.

5. SUGGESTIONS FOR EFFECTIVE IMPLEMENTATION OF CURRICULUM

Curricula for degree programmes in engineering and technology have been designed by SSU Palampur faculty with close cooperation of SSE Badhani and Amritsar They have understood the systematic approach of curriculum development and implementation. While designing the curriculum they have taken in to account employment scenario, equivalence with PTU curriculum and experience of implementing existing curriculum.

Some of the suggestions for effective implementation of curriculum are:

-1.Vision and mission of institute, Philosophy objective and outcome of curriculum of programmes should be understood by all teachers and students. These should be displayed in the Department so that expectation of all stake holders are clear to everyone.

2.Principal with Head of Departments should analyze the curriculum to find out the requirement of resources for its implementation and prepare an action plan for their availability in time. Institute should network with other organizations for sharing resources and adopt innovative approaches for managing whole courses.

3.HOD's and teachers are managers of whole programmes and subject teaching respectively. Their success in achieving objectives depends on preparing academic plan and its judicious execution.

4.Teachers should prepare rationale and objective of their respective subjects, structure of content, method and media and table of specification for evaluation. This should be given to student so that they are aware of the outcome of the course.

5.Set up a group of teachers and final year students for sharing experiences of curriculum implementation and suggest further improvement.

6.Teachers are required to plan as follows for carrying out teaching learning process effectively: -

(a) Prepare profile of students for knowing their background and strengths so as to facilitate them in fulfilling their dreams of jobs and life.

(b) Analyze programme and develop teaching plan.

(c) Plan for guided self study exercises for student and available learning resources like journals, web site, educational video programming etc in addition to visit to industries and organizing industrial training, arranging expert lecture by alumni and experts from industry/ field.

(d) The co-curricular activities like organizing different camp, social gathering study tour, hobby club etc may be used to develop generic skills like communication skills, task

Management, problems solving, managing self, stress Management, Time Management and collaborating with others etc.

1. A project bank may be developed by the concerned department of the university in consultation with industry, research and other relevant field organizations.

2. Student may be given practical assignment and project to develop practical skills. This will help them in developing creativity and confidence for their gainful employment, (wage and self).

3. (a). Teachers and students should be aware of objectives and outcomes of whole programme and the role played by each subjects in achieving them as part of the curriculum.

   (b). Identification of project and their details should be prepared by all teachers in consultation with students at the beginning of the year. The projects should relate to state of art technology and require use of theoretical and advance planning practical knowledge.

   ©. Self learning and learning beyond syllabus should be encouraged by including optional subjects with scope of learning.

   (d). Department should develop a feedback Mechnism for teaching performance and a reward system for doing excellence work.

   (e) Academic calendar should include remedial classes and additional make up test to help academically weaker students. Students involved in mentoring junior students should be should be rewarded, who are actively doing mentoring.

6. APPENDIX

A. STUDENT CENTERED ACTIVITIES

Student centered activity play an imported role in the development of students of independent learning and self confident among students. Consulting library and visit to market or industry for gathering search information. This information will be presented by students during seminars. Expert lectures by eminent person from technical education, industry, culture areas; and alumni of the institute will also be arranged. Students will also undertake activities like mentoring students poor in academics, community service in respect of technology transfer entrepreneurship development and environmental awareness for fulfilling the outcome of programme.

B. MAJOR PROJECT WORK

(Industry/field oriented-practice based)

As far as possible students shall be assigned live project problem with a view to:

1 Develop understanding regarding the size and scale of operation and nature of field work in which Students are going to plan their role after completing the programme of study.

2 Develop understanding of subject based knowledge given in the classroom in the control of its application at work place.

3 Provide first hand experience to develop confidence amongst the students to enable them to use and apply classroom based knowledge skills to solve practical problem of the world of work.

4 Develop social skills and abilities like interpersonal skills, communication skills, attitude and values.

For the fulfillment of above objective, SSU University will establish close linkages with 20-25 relevant organizations and provide such experience to students. It is necessary that each organization is visited well in advance by respective teachers and projects activities to be performed by students are well defined. Efforts should be made to identify actual field problems to be given as project work to the students. Project selected should be challenging. Such chosen projects assignment should be entrusted to students which are of professional value to industrial/field organization. Each teacher would supervise and guide 10-15 students.

. The placement of students for such a practical cum project work should match with the competency profile and interest of students. Students are to be assessed both by industry and engineering college faculty.

The suggested performance criterion is given below:

a)	Punctuality and regularity	10
b)	Initiative in learning/ working at site	10
c)	Level/processing of practical skills acquired	10
d)	Sense of responsibility	10
e)	Self expression/ communication skills	10
f)	Interpersonal skills	10
g)	Reports writing skills	20
h)	Viva voce	20

Note :The above is a guideline only. Ssu palampur may devise its own criteria in consultation with industry.

C. ENTREPRENEURSHIP DEVELOPMENT CAMP AND SETTING SELF BUSINESS CLUB IN INSTITUTE

A large population of degree holders has to think of setting up their own enterprises or businesses due to lack of opportunities in organized sector. They have to be motivated and trained to search for new opportunities and avail these for becoming an entrepreneur. For this they must be acquainted with entrepreneurship development, scope of setting up self enterprise, existing business opportunities, financial support available and various aspects of managing business. In this context an entrepreneurship awareness camp is suggested. During the camp, experts from various organizations such as banks, financial corporations, service institutes etc. Should be invited to deliver expert lectures. Successful entrepreneurs should also be invited to interact with the students. Students may be encouraged to read papers or give seminar during the camp, on entrepreneurship development related topics.

1. The camp is to be organized for two to three days at a stretch during fifth semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject.

- Who is an entrepreneur?
- Need for entrepreneurship, entrepreneurial career and self employment.
- Scenario of development of small scale industries/service organization in India and other countries.
- Entrepreneurial history in India, Indian values and entrepreneurship.
- Consideration for product/business selection.
- Opportunities for business, seminar and industrial ventures.
- Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs).
- Managerial aspects of small business.
- Legal aspects of small business.

2. Assistance from District Industries Centers, Commercial banks, and state Financial Corporation's Small industries service Institutes, Research and developments laboratories and other financial and Development Corporation.

3.In order to arrange successful entrepreneurship awareness camp, a group of interested students for setting up their self business may be identified and given responsibility of undertaking the above .A follow up mechanisms should be evolved at the institute in order to enable student to set up and manage their enterprise. This group should regularly meet after a month to see the progress of their project and get inputs from mentors.

D. ECOLOGY AND ENVIRONMENTAL AWARENESS CAMP

A degree holder must have knowledge of different types of pollution caused due to public, Industries and construction activities. So that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

This can be done by organizing a camp at a stretch for 3-4 days. Lectures will be delivered on following broad topics. There will be no examination for this subject. Students interested to contribute in improving ecology and environment of the institute or community through various projects, may be allotted marks out of 20 (a part of final year project)

1. Sources of pollution natural and manmade, their effects on living and non living organisms.
2. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods, methods of vermin composting.
3. Pollution of air-causes and effects of man, animal, vegetation and non living organisms.
4. Pollution of water causes, effects of domestic waste and industrial effluent on living and non-living organisms.
5. Legislation to control pollution and protect environment.
6. Recycling for taking advantage of waste and reducing pollution.

It is suggested that, at the institution level, a voluntary group be formed for taking care of ecological balance by undertaking waste management projects- which would result in additional revenue to the institute, besides presenting a more friendly environment.

H. INDUSTRIAL TRAINING

Industrial Training shall be accomplished through attachment with an industry/ service sector organization. Teachers in consultation with industry/ service sector will identify the problem/ project for students. A Group of students placed in city will be monitored by the faculty or expert appointed for the purpose. During the 6 month training, the students will be required to maintain a training diary which will be required to be duly authenticated by his supervisor in the industry.