

**COURSE STRUCTURE & SYLLABUS OF
BACHELOR OF TECHNOLOGY (B.TECH)
Mechanical/ Electrical/ Electronics/ Computer/ Civil**

**Course Structure First Year
(Common for all streams)**

First Semester

Paper Code	Subject
BF1	Mathematics – I
BF2	Chemistry
BF3	English for Communication
BF4	Electrical Technology
BF5	Mechanics
BF6	Introduction to Manufacturing Process

SYLLABUS

BF1 : MATHEMATICS I

1 : LIMITS AND CONTINUITY OF A FUNCTION.

2 : DIFFERENTIATION.

Definition, Derivative by first principle, Differentiation of implicit functions, Differentiation of trigonometric functions, Differentiation of inverse trigonometric functions, Transformation, Differentiation of exponential and Logarithmic Functions, Hyperbolic functions, Derivatives of the inverse hyperbolic functions, Differentiation with respect to a function, Differentiation of Parametric Equations.

3 : SUCCESSIVE DIFFERENTIATION

Calculation of nth derivative, Leibnitz's theorem.

4 : GENERAL THEOREMS, EXPANSION OF FUNCTIONS.

Rolle's Theorem, Mean value theorem (Lagrange's form), Increasing and Decreasing functions, Mean value theorem (Cauchy's form).

Expansion of functions;

Taylor's expansion theorem, Maclaurin's theorem, Taylor's and Maclaurin's infinite series.

5 : INDETERMINATE FORM

L' Hospital's rule, Evaluation of $\frac{0}{0}$ form, Evaluation of $\frac{\infty}{\infty}$ form, Evaluation of $\infty - \infty$ form, Evaluation of 0^0 ,

1^∞ , ∞^0 form.

6 : CURVATURE

Radius of curvature, Special formula for parametric equations, Radius of curvature at the origin.

7 : MAXIMA AND MINIMA

Maximum and Minimum values of a function.

8 : ELEMENTARY INTEGRATION

Table of elementary integrals, Simple examples.

9 : INTEGRATION BY SUBSTITUTION

Introduction, Change of independent variable in $\int f(x)dx$, Working rule to evaluate $\int f(x)dx$ by the substitution, Four important integrals, standard forms, Integrals of $\tan x$, $\cot x$, $\sec x$, $\operatorname{cosec} x$.

10 : INTEGRATION BY PARTS

$\int u.vdx$, $\int e^x [f(x) + f'(x)]dx$, Important integrals.

11 : INTEGRATION BY PARTIAL FRACTIONS

Non-repeated linear factor, Repeated linear factor, Linear and quadratic factors (non-repeated) Quadratic (repeated), Integration of rational fraction by substitution.

12 : INTEGRATION OF IRRATIONAL ALGEBRAIC FUNCTIONS

Integration of rational functions, integral of the type $\int \frac{dx}{x\sqrt{y}}$

13 : INTEGRATION OF TRIGNOMETRIC FUNCTIONS

$\int \sin^m x \cos^n x dx$, Reduction formula method, Integration of positive even integral, Integrals of rational functions of $\sin x$ and $\cos x$.

14 : REDUCTION FORMULA

$\int \sin^n x$, $\int_0^{\pi/2} \sin^n x dx$, $\int \sin^p x \cos^q x$, $\int_0^{\pi/2} \sin^p x \cos^q x dx$, $\int \tan^n x dx$, $\int \sec^n x dx$, $\int \operatorname{cosec}^n x dx$, $\int \cot^n x dx$.

15 : DEFINITE INTEGRALS

Definition, Properties of definite integrals, Examples base on properties.

16 : AREAS OF PLANE CURVES

17 : VOLUMES AND SURFACES OF SOLIDS OF REVOLUTION

18 : LENGTHS OF PLANE CURVES

Arc Formulae, Arc formulae for polar equations.

19 : SIMPSON'S RULE

BF2 : CHEMISTRY

1. WATER TREATMENT:

Introduction, Sources of Water, effect of Water on Rocks and Minerals, Types of Impurities Present in water, Effects of Impurities in Natural Waters, Methods of Treatment of Water for Domestic and International Purposes, Removal of Dissolved Salts: Softening of Water, Boiler Feed Waters, Boiler Troubles.

2. FUELS

Introduction, Classification of Fuels, Solid Fuel (Coal), Classification of Coal by Rank, Analysis of Coal, Pulverized Coal, Metallurgical Coke, Manufacture of Metallurgical Coke, Liquid Fuels, Petroleum, Refining of Petroleum, Synthetic Petrol, cracking, Polymerisation, Synthetic Method, Refining Gasoline, Reforming, knocking, Gaseous Fuels, Natural gas, Producer Gas, Water Gas or Blue Gas, Bio-gas, Fuel gas.

3. LUBRICANTS

Introduction, Functions of Lubricant, Requirements of a Lubricant, Mechanism of Lubrication, Classification of Lubricants, Properties of Lubricating oils, Glossary, Questions.

4. POLYMERS AND PLASTICS

Introduction, Polymerisation, Classification of Polymers, Tacticity, Functionality of Polymer, Polymerisation Processess, Mechanism of Addition Polymerisation, Effects of Structure on Polymer Properties, Plastics, Compounding of Plastics, Thermoplastics resins, Silicones resins, Elastomers or rubber, Adhesives, Glossary,

Questions.

5. THERMODYNAMICS

Introduction, Laws of Thermodynamics, Isothermal and adiabatic Processes, Thermochemistry, System, Glossary, Questions.

6. CORROSION

Introduction, Characteristics of Corrosion, Mechanism of Corrosion of iron, Types of Corrosion, Corrosion and redox Process, Factors Which influence Corrosion, Corrosion Control, Glossary, Questions.

7. ENVIRONMENTAL POLLUTION CHEMISTRY

Introduction, Important definitions, Air Pollution, Water Pollution, Soil Pollution, Pollution by heavy metals, Glossary, Questions.

8. METALLIC BOND AND SEMICONDUCTORS

Introduction, Nature of Metallic bond: Theories, Mechanism of thermal Conduction, Mechanism of electrical conduction, Ductility and malleability, Thermal conductivity, Electrical Conductivity, Photoconductors, Semiconductors, Glossary, Questions.

BF3 : ENGLISH FOR COMMUNICATION

1. THE COMMUNICATION EVENTS

Nature Of Communication, Objective, Definition Of Communication, Situation For Communication, Need Of Communication, Types Of Communication, Verbal Or Oral Communication, Elements Of Communication , Modes Of Communication (Verbal And Non-Verbal), Charts And Graphs, Flow Process Chart, Written Communication , Oral Communication, Media: Channels Of Communication, Message : Form And Content, Communication Process, Effective Communication, Barriers Of Communication, Summary

2. SUMMARIZATION

Summary Writing

3. COMPREHENSION AND VOCABULARY

Comprehension, Vocabulary [(A) Synonyms And Antonyms, (B) Homonyms, (C) Same Word Used As Different Parts Of Speech, (D) One Word Substitution], Word Formation, Root

4. PRINCIPLE OF LANGUAGE GRAMMAR AND USAGES

The Sentence Elements, Words, Phrases, Clauses Sentences, Sentence, The Word, Noun, Verb, Tenses And Their Usages, The Verb : Person And Number, Agreement Of The Verb With The Subject, The Infinite, Adverbs, Adjectives, Preposition, Relations Expressed By Prepositions, Conjunction, Clauses, Determiners And Modifiers, Sentence Connectives, The Compound And Complex Verb Phrase, Complementation And Subordination, Sentences, Change Of Voice, Change Of Degree, Affirmative And Negative Sentences, Direct And Indirect Speech, Conversion Of Compound Sentences Into Simple Sentences, Conversion Of Complex Sentences Into Compound Sentences, Punctuation

5. BASIC OFFICIAL CORRESPONDENCE

The Process Of Formal Written Communication, The Qualities Of Good Writing, Principles Of Message Organization, Mechanics Of Writing, Elements Of Structure, Forms Of Layout, Styles Of Presentation, Types Of Letters ,Enquiry Letter, Making Claims, Offering Adjustments, Communication Core, Importance And Function, Drafting The Application, Elements Of Structure, Preparing The Resume, Job Offer, Resignation Letter, Communication Core

6. TECHNICAL WRITING

Framing Definitions, Classification And Description Of Objects, Instructions, Types Of Instructions

BF4 : ELECTRICAL TECHNOLOGY

1. BASIC CONCEPTS & UNITS:

Force, Weight, torque, work, energy, Power, Electric charge, Electric Current, EMF, Voltage, Potential Difference Concepts of Ac/Dc Voltage/current.

2. ELECTROSTATICS:

Coulomb's Law, Electric Field, Electric Flux, Electric Field Intensity, Electric Flux Density, Electric Displacement, Charge Density, Permittivity, Dielectric Constant, Electric Potential, Gauss Law, Capacitor, Capacitance of parallel Plate Capacitor, Energy Stored in Capacitor, Capacitors in Series & Parallel, Capacitance of a Multiplate Capacitor, Force of Attraction between plates of Capacitor, Insulation Resistance of Cable.

3. ELECTRIC CIRCUIT ELEMENTS:

Resistance, Specific Resistance, Resistance in Series & Parallel, Open Circuit and Short Circuit, Temperature Coefficient of Resistance, Linear & Non-linear Resistance, Inductance, Energy Stored in Inductance, Inductance in Terms of Flux Linkage Per Ampere, Inductance in Series & Parallel, Linear & Non-linear Inductances.

4. ELECTROLYSIS & STORAGE CELL:

Electrolysis, Faraday's law of Electrolysis, Primary & Secondary Cells, Equivalent Circuit of Cell, Rating of Cell, Cells in Series & parallel, Lead Acid Battery, Nickel Cadmium Cell, Zinc Carbon Cell.

5. ELECTROMAGNETISM:

Magnetic Field, Electromagnetism, Magnetic & Non-Magnetic Materials, Permanent & Temporary magnets, Magnetic flux Density, MMF, Magnetic Field Strength, Force on a Conductor Carrying Current in a Magnetic Field, Biot Savart Law, Ampere's law, Permeability, Force between parallel Conductors, Definition of Ampere, magnetic Shielding, B-H Curve, Magnetisation Curve, Hysteresis, Hysteresis Loss, Modern Theory of Magnetism, Electromagnetic Induction, Fleming Right Hand Rule, Lenz's law, Dynamically Induced e.m.f., Statically induced e.m.f., Eddy Currents, Eddy current loss, Self & Mutual Inductance, Coefficient of Coupling.

6. SINGLE PHASE AC CIRCUITS:

Alternating Voltage & Current, Phase Angle, Phase Difference, Average Value of Sinusoid, Root mean Square or Effective Value, Representation of Sine Wave by Phasor, Alternating Current and Power in Resistive Circuit, Alternating Current and power in Capacitive Circuit, Alternating Current in Series RL Circuit, Apparent, Active & Reactive Power & Power Factor, Alternating Current & Power in RC Circuit, Alternating Current & Power in RLC Series Circuit.

BF5 : MECHANICS

1 INTRODUCTION

Introduction to Mechanics, Definitions, Idealisation in Mechanics, Basic Concepts, Fundamentals Principles, System of Units, Dimensional Analysis, Methods of Solution, Vector Algebra, Summary.

2 STATICS OF PARTICLES CONCURRENT FORCES IN PLANE

Introduction, Resultant of Forces, Resolution and Components of Force, Resultant of Several Concurrent Forces, Equilibrium of a Particle, Equation of Equilibrium, Application of Statics of Particles, Summary.

3 STATICS OF PARTICLES CONCURRENT FORCES IN SPACE

Introduction, Components of Forces in Space, Resultant of Several Concurrent Forces, Equilibrium of a Particle in Space, Application of Statics of Particle, Summary.

4 STATICS OF RIGID BODIES___ NON – CONCURRENT FORCES IN PLANE

Introduction, Moment of Force about a Point, Varignon's Theorem, Moment of Couple, Resolution of a Given Force into a Force, Resultant of Coplanar Non-Concurrent System, Application of Statics of Rigid Bodies, Method of Minimum Potential Energy- Stable Equilibrium, Summary.

5 STATICS OF RIGID BODIES-NON-CONCURRENT FORCES IN SPACE

Introduction, Moment of Force about a Point, Moment of Force about a Given Axis, Couples in Space, Resolution of Force into Force and Couple, Resultant of Non-concurrent, Non-coplanar System, Equilibrium of Rigid Body in Three Dimensions, Summary.

6 FRICTION

Introduction, Characteristics of Dry Friction, Laws of Friction, Angle of Friction, Angle of Repose, Cone of Friction, Applications, Summary.

7 CENTROID AND CENTRE OF GRAVITY

Introduction, Centroid of Area, Line and Volume, Centroid of a Line, Centroid of Area, Centroid of Composite Area, Theorems of Pappus and Guldinus, Centroid of Volume, Centre of Gravity, Centre of Mass, Summary.

8 MOMENT OF INERTIA AND MASS MOMENT OF INERTIA

Introduction, Second Moment of Area, Moment of Inertia of Plane Area by Integration, Moment of Inertia of Composite Section, Principle Axes and Principle Moments of Inertia of a Thin Rectangular Plate, Mass Moment of Inertia, Summary.

9 SIMPLE STRESSES AND STRAINS SSS-1

General Meaning of Stress, Unit of Stress, Simple Stresses, Strain, Stress Strain Relation, Nominal Stress and True Stress, Behaviour of Materials Under Repeated Loadings, Factor of Safety, Hooke's Law, Extension/Shortening of a bar, Bars With Cross-Sections Varying in Steps, Bars With Continuously Varying Cross-Sections, Bars Subjected to Varying Loads, Indeterminate Structural Problems, Compound Bars, Temperature Stresses, Simple Shear, Poisson's Ratio, Volumetric Strain, Elastic constant, Relationship between Modulus of Elasticity and Modulus of Rigidity, Relationship between Modulus of Elasticity and Bulk Modulus, Strain Energy due to Direct Stresses and Impact Loads, Strain Energy due to Shear Stresses.

10 SHEAR FORCE AND BENDING MOMENT DIAGRAM IN STATICALLY DETERMINATE BEAMS SFB-1

Shear Force and Bending Moment, Sign Convention, Relationship between Load Intensity, Shear Force and Bending Moment Diagrams, SF and BMD For Standard Cases, SF and BMD for Beams Subjected to Various Loads, Short Cut Procedure.

BF6 : INTRODUCTION TO MANUFACTURING PROCESSES

UNIT I :

1. MILLING MACHINES

Introduction; classification and types; Size and specifications; Accessories attachment; Milling cutters; Classification and types of milling cutter.; Nomenclature of cutter; Setup-operation ; Method of feeding work piece; Operation on milling machine; Indexing (simple compound, differential angular) ; Helical milling cam milling ; Cutting speed & ledge ; Machining time calculation; Milling operation compound with other operations

2. THE LATHE

Introduction, Functions, Types, Descriptions & Functions of Lathe Parts, Lathe Accessories & attachments, lathe Operations.

3. GRINDING MACHINE

Introduction.; Types of Grinding machines (Floor stand, Precision. Plain, cylindrical, universal centrals Internal, surface disc); Special grinding machine, (Tool and cutter grinder, cam and shape grinders); Shape of grinding wheel; Grinding wheel designation as per- IS -551 -19-54; Grinding wheels ; Grinding wheel elements (abrasives - its types, Grain sizes, Grade, structure, bonding material etc.); Diamond wheel; Grinding wheel section; Allowances for grinding wheel; Mounting of Grinding wheel; Dressing and curing, of grinding wheel

4. BORING, BROACHING AND SAWING MACHINE

Introduction to Boring machines ; Types of Boring machine ; Boring heads and heads; Various operations using boring heads; Boring operations using end supports; Introduction to Broaching machine ; Types of Broaching machine; Broaching tool nomenclature; Types of Broaches; Broaching operations compared with other process (advantages & limitations.); External; Lubrication and cooling; Application of Broaching

5. GEAR MANUFACTURING

Gear tooth element; Materials for Gears; Different methods of Gear manufacturing ; Gear generating methods; Gear milling ; Gear shaping (Working principle of machine tool required Gear shaping cutters etc.) ; Gear Hobbing (Working principle of machine tool required Gear hobbing operation) ; Gear finishing process (Gear shaving burnishing, grinding honing lapping

6. METAL FINISHING PROCESS

Introduction; Honing; Description and construction of honing tool.; Application of honing process; Lapping; Description of Lapping compound and tool; Application of Lapping ; Super finishing process Burnishing - Polishing - Buffing ; Application of super finishing operations.

7. PATTERN MAKING

Introduction, Pattern Materials, Pattern Making Tools, Pattern Allowances, Types of Patterns, Solid or Single Piece Pattern, Split Pattern, Match Plate Pattern, Cope and Drag Pattern, Loose Piece Pattern, Gated Pattern, Sweep Pattern, Skeleton Pattern, Shell Pattern, Segmental Pattern, Follow Board Pattern, Lagged-up Pattern, Left and Right hand Pattern, Core Boxes, Colour coding for Pattern and Core Boxes.

8. MOULDING AND CORE MAKING

Introduction, Moulding Materials, Moulding Sand, Sand Binders, Sand Additives, Properties of Moulding Sand, Classification of Moulding Sand, Grain Shape and Size of Sand, Preparation of Moulding Sand, Types of Moulding Sand, Moulding Processes, Types of Moulds, Methods of Moulding, Methods of Green Sand Mould by Turn Over Method, Gates and Risers, Types of Gates, Moulding Methods with Typical Patterns, Cores, Types of Cores, Core Binders, Core Making, Core Setting, Core Shifting and Chaplets.

9. CASTING PROCESSES

Introduction, Permanent Mould Casting, Semi-permanent Mould Casting, Slush Casting, Die Casting, Centrifugal Casting, Investment Casting, Shell Moulding Process, Continuous Casting, Defects in Casting, Cleaning of Castings, Inspection of Castings, Design of Castings.

10. WELDING

Introduction, Weldability, Advantages and Disadvantages of Welded Joints, Types of Welded Joints, Cold Pressure Welding, Types of Welded Joints, Fillet Welded Joints, Edge Preparation and Applications, Welding Positions, Black Smith's Forge Welding, Electric Resistance Welding, Types of Electric Resistance Welding, Spot Welding, Roll Spot and Seam Welding, Projection Welding, Butt Welding, Percussion Welding, Arc Welding, Polarity in Arc Welding, Comparison Between A.C. and D.C. Arc Welding, Types of Arc Welding, Electrodes for Arc Welding, Arc Welding Equipment, Precautions in Arc Welding, Arc Welding Processes, Carbon Arc Welding, Metal Arc Welding, Metallic Inert-gas (MIG) Arc Welding, Tungsten Inert-gas (TIG) Arc Welding, Atomic Hydrogen Welding, Stud Welding, Submerged Arc Welding, Plasma Arc Welding, Flux Cored Arc Welding, Electro-slag Welding, Electro-gas Welding, Thermit Welding, Solid State Welding, Modern Welding Processes, Basic Weld Symbols, Supplementary Weld Symbols, Elements of a Welding Symbol, Standard Location of Elements of a Welding Symbol, Gas Welding, Equipment for Oxy-acetylene Gas Welding, Welding Rods, Fluxes, Gas Flame, Gas Welding Technique, Gas or Oxygen Cutting of Metals, Cutting Machines, Oxygen Lance Cutting, Arc Cutting, Oxygen Arc Cutting Process, Welding of Various Metals, Testing of Welded Joints, Braze Welding, Soldering, Brazing.

11. RECENT DEVELOPMENT IN MANUFACTURING PROCESS

Introduction, Working of NC Machines tools, Classification of NC Machines, Programming for NC Machines, Methods of Listing the Co-ordinates of points in NC System, Application of NC Machine, Advantages & Disadvantages, Computer Numerical Control & Direct Numerical Control.

UNIT 2 : (ONLY FOR BF6 STUDENTS)

12. FOUNDRY TOOLS AND EQUIPMENTS

Introduction, Foundry Tools and Equipments, Foundry Hand Tools, Moulding Boxes (Flasks), Moulding Machines, Melting Equipment, Pouring Equipment.

13. HOT AND COLD WORKING PROCESS

Introduction, Objectives, Hot Working Process, Hot Rolling, Types of Rolling Mills, Hot Forging, Hot Spinning, Hot Extrusion, Hot Drawing or Cupping, Hot Piercing, Cold working process, Cold Rolling, Cold Forging, Cold Spinning, Cold Extrusion, Cold Drawing, Cold Bending, Shot Peening.

14. POWDER METALLURGY

Introduction, Objectives, Characteristics of Metal Powders, Preparation of Metal Powders, Process used for Manufacturing parts from Metal Powders, Primary Processes, Secondary Processes, Advantages of Powder Metallurgy, Limitations of Powder Metallurgy, Design Considerations for Powder Metallurgy, Typical Applications of Powder Metallurgy.

15. PLASTIC MANUFACTURING PROCESS

Introduction, Objectives, Types of Plastics - Thermosetting Resins & Thermoplastic Resins, Synthetic Rubber or Elastomers, Moulding Compounds, Fabrication of Plastics, Machining of Plastics, Joining of Plastics.

UNIT 3 : (ONLY FOR BSM5 STUDENTS)

1. Metal Cutting and Cutting Tools

2. Drilling Machines

3. Shaper, Planner and Slotting Machine

COURSE STRUCTURE & SYLLABUS OF BACHELOR OF TECHNOLOGY (B.TECH)

Course Structure

First Year

Second Semester

Paper Code	Subject
BF7	Mathematics - II
BF8	Applied Physics
BF9	Programming and Data Structure
BF10	Basic Electronics
BF11	Engineering Drawing and Graphics
BF12	Environmental Studies

SYLLABUS

BF7 : MATHEMATICS - II

1. MATRICES

Definition, Elements of matrix , Types of matrices ,Algebra of matrices , Properties of matrix multiplication, Method of finding the product of two matrices, Transpose of matrix , Symmetric and Skew-symmetric matrix , Theorem, Adjoint of a matrix, Inverse of matrix, Theorem , Adjoint of a matrix, Inverse of matrix, Elementary Transformation of a matrix, Rank of matrix , Solution of simultaneous linear Equation, consistency of equation, characteristics roots or Eigen values, Caley- Hamilton Theorem, Question Bank, Examination papers.

2. FINITE DIFFERENCE & DIFFERENCE EQUATION & NUMERICAL METHODS:

Finite Difference: Operators, Difference table, Newton's formula , Lagrange's interpolation formula, Difference Equation: Introduction , Solution of a difference equation, Question Bank: Difference Equation, Numerical methods: Newton Raphson method , Method of false position, Iteration method.

3. DIFFERENTIAL EQUATIONS:

Definition, Order and degree of differential equation, Formulation of Differential Equation, Solution of a differential equation, Differential Equation of first order and first degree , variable separable, Homogeneous Differential Equations , Equation Reducible to homogeneous form, Linear differential equation,. Equation Reducible to the linear form, Exact differential equation, Equation of first order and higher degree, Complete Solution = C.F. + P.I., Method of finding the complementary function, Rules to find particular integrals.

Application of Differential Integrals: Physical applications of linear equations.

4. FUNCTIONS OF COMPLEX VARIABLE:

Introduction, Complex variable, Functions of complex variable, Limit of a complex variable, Continuity, Differentiability, Analytic function, The necessary condition for $f(z)$ to be analytic, Sufficient condition for $f(z)$ to be analytic, C-R equation in polar form, Harmonic functions, Method to find the conjugate function, Milne Thomson method, Mapping of transformation, Bilinear transformation, Schwarz-Christoffel transformation.

Complex Integration: Cauchy's integral theorem, Cauchy's integral formula, Cauchy's integral formula for the derivative of an analytic function, Taylor's theorem, Laurent series, Singularity if a function, Residues, Cauchy's Residue theorem.

BF8 : APPLIED PHYSICS

UNIT – I

Interference, Interference of wave , Interference due to thin films of uniform thickness, Interference due to thin films of non-uniform thickness, Newton's ring, Michelson's Interferometer, Engineering applications of Interference, Relativity, Relativity of mass: Time dilation, length contraction, mass and energy, Doppler's effect.

UNIT-II

A. Diffraction:

Diffraction of wave, Classes of diffraction, Fraunhofer diffraction at a single slit, Condition for maxima and minima, Diffraction at a circular aperture, Plane diffraction grating, Conditions for Principle maxima and minima , Resolving Power, Rayleigh's Criterion for resolution of two Point objects, R.P of grating, R.P at Telescope, X-ray diffraction, Law spots, Bragg's Law, Bragg's X-ray spectrometer,

B. Ultrasonics:

Ultrasonic waves, Piezo electric effect, Production of U.Waves by P. electric, Magnetostriction effect, Production of U. Waves and its uses, Flow detection.

C. Polarisation:

Polarisation by reflection, Brewster's law, Double refraction, Positive and negative crystal , Nicol Prism, Law of Malus, Elliptical and Circular Polarisation, Quarter and half wave Plates, Production of Polarised light, analysis of light.

D. NUCLEAR PHYSICS

UNIT-III.

A.Wave Particle Quality:

Concept of group velocity, Phase velocity, Wave nature of matter, De-broglie waves, Derivation of De-broglie's formula by analogy with radiation. Wave length of matter waves, Electron diffraction, Davisson and Germer's experiment, Heisenberg uncertainty.

B. Wave Equation:

Concept of wave function and probability interpretation, Schrodinger's time –dependent and time independent wave equations, Physical significance of wave function, Application of Schrödinger's time- independent wave equation, Tunneling effect, Tunnel Diode.

UNIT-IV

A. Laser

B.Magnetism

UNIT-V

A. Semiconductor Physics:

B. Modern Physics:

Motion of an electron in electric and magnetic field, Specific charge of an electron, electrostatic and magnetostatic focusing, Electron microscope, Bainbridge mass spectrograph, Positive ray, Scanning electron microscope.

BF9 : PROGRAMMING AND DATASTRUCTURE

1. **Introduction To Computers:** Introduction to Computers, its evolutions. First, second, third, fourth, fifth generation of computer. Basics of data, information, and data processing.
2. **Number System:** Number System , Representation of information , Positional Number System , Non positional number system, bit ,byte ,radix , floating point, The Binary Number Base Systems, Binary-Decimal, decimal–binary conversion. Octal, Hexa- Decimal Number system. Simple problems for conversion of Hexadecimal, Octal to other number system etc. Binary Coded Decimal, Extended Binary Coded Decimal Interchange Code ASCII notations –advantages disadvantages.
3. **Binary Arithmetic :** Binary Addition, Binary Subtraction, Multiplication, Division and their simple examples. Logic gates : AND ,OR ,NAND, NOR gates.
4. **Computer Software :** Software System- application Software and their Examples in real life. Operating System and their usage. Multitasking –Multiprogramming- Multiprocessing Operating System. An overview of WWW and its Software. Flow charts and simple problems on flow chart.
5. **Computer Hardware :** Hardware :Basic PC Components, Monitors, Keyboard, Storage devices :Hard Disk ; Storage related simple problems, CD, Mother-board, Printers its classification etc, OCR, OMR, BAR Code etc.
6. **Memory Hierarchies :** Main Memory ,Secondary Memory , RAM ROM , PROM, EPROM, EEPROM etc.
7. **Processing Unit :** CPU ;ALU, Components of CPU ; Register, Accumulator, IR, etc Concepts of vector Processing, Array Processing.
8. **Elements Of Programming Languages Fortran & C:**
Introduction to programming logic , algorithm , simple types of real integer variables in FORTRAN and C. Mathematical representations of C and FORTRAN functions. Simple programs in C programming language.

BF10 : BASIC ELECTRONICS

1. ELECTRONIC COMPONENTS

(1) Passive Components :-

- (i) Resistors :- Types, Rating, Colour Code, Tolerance, Fixed Value, Variable (Potentiometer), Thermistor, Negative & Positive temperature Coefficient, Basic Construction of Various types of Resistors.
- (ii) Capacitors :- Types (air, paper, ceramic, mica, electrolyte), Fixed Value & Variable, Rating , Basic Construction.
- (iii) Inductors :- Types, Inductors of high frequency application.

(2) Active Components :-

- (i) Voltage & Current Source
- (ii) Ideal and Practical Voltage Source & Current Source, equivalent circuit, Conversion of Voltage Source into current source and vice-versa.

2. SEMICONDUCTOR THEORY AND P-N JUNCTION

Insulator, Intrinsic and Extrinsic Semiconductors, Energy bar diagrams, Doping, Conduction in Semiconductors, P-N junction, Forward and Reversed biased p-n junction, V-I characteristics of p-n junction diode.

3. SPECIAL PURPOSE DIODE

Zener diodes, Tunnel diodes, Varactor diodes, Schottky diodes, Light emitting diode (LED's), Diodes for High Frequency applications.

4. P-N-P AND N-P-N TRANSISTORS

Base, Common Emitter and Common Collector (CB, CE, & CC) Configuration, Biasing of transistors, methods of Transistor Biasing, Base Resistor Method, Biasing with flb resistors,

Voltage divider bias method, Transistor action & Characteristics, Comparison of CB, CC & CE configuration, Application of CB, CE, & CC configuration.

5. FIELD EFFECT TRANSISTOR (FET):-

Construction, Operation & characteristic of FET, FET as a switch, Typical application of FET, MOSFET-Working Principle of MOSFET.

6. INTEGRATED CIRCUITS (IC'S):-

OP-AMP Characteristics, inverting & non-inverting OP-AMP, Differential Op-Amp's, Common Mode Rejection, application of OP-AMP (Adder, Subtractor, Voltage follower, Integrator, Differentiator)

BF11 : ENGINEERING DRAWING AND GRAPHICS

1. FUNDAMENTAL OF ENGINEERING DRAWING:

Introduction, Use of Different Drawing Instruments, Dimensioning, Scales, Geometrical constructions.

2. ENGINEERING CURVES:

Introduction, Conic sections, Different methods of constructions of Cycloidal Curves, Cycloid, Epicycloid, Hypocycloid, Involute, Spiral, Helix.

3. ORTHOGRAPHIC PROJECTIONS:

Introduction, First Angle Method of Projections, Third angle method of projections.

4. ORTHOGRAPHIC SECTIONAL VIEWS:

Introduction, Full Section, Sectional side view, Horizontal Section, Offset section, Ribs in section, cutting planes/section planes.

5. ISOMETRIC PROJECTIONS:

Isometric projection and Isometric Axes, Isometric scale, None – Isometric Lines, Angles, Curves and Circles in Isometric.

6. PROJECTIONS OF STRAIGHT LINES:

Introduction, Line parallel to two principle planes and perpendicular to the third, Line parallel to one principle plane and inclined to the other, oblique line, Traces of Lines.

7. PROJECTION OF PLANES:

Types of planes, various positions of planes, Traces of planes, planes parallel to one reference plane, planes perpendicular to one reference plane and inclined to the other oblique planes, projections on Auxiliary planes.

8. PROJECTION OF SOLIDS:

Types of Solids, Frustums and truncated solids, Various positions of Solids, Axis of Solid is perpendicular to one reference plane, Axis of the solid is parallel to one reference plane and inclined to the other, Oblique solid axis inclined to both the H.P and V.P.

9. SECTIONS OF SOLIDS:

Introduction, section plane, portion of solid assumed to be removed, section, section lines, Apparent section, True shape of section, sectional view.

10. DEVELOPMENT OF SURFACES:

Introduction, Application of Development of surfaces in Engineering products, method of Development concepts of points and lines, Development of prisms, Development of cylinder, Development of pyramid, Development of cone.

11. FREE –HAND SKETCHES:

Introduction, Terminology used in the screw threads, V or triangular threads, ISO –metric screw threads, screw fastenings, Hexagonal Nut, Square nut, Flanged nut capnut, Domet, capstan nut, Ring nut, wing nut, washers, Bolts, Hexagonal Headed bolts, Square headed bolt, cheese or cylindrical headed bolt, cup headed bolt, cheese or cylindrical headed bolt, cup headed or round headed bolt, T-headed bolt, counter sunk headed bolt, Hook bolt, Eye bolt, different types of studs, screws, Locking arrangement for nut, foundation bolts, Rivets and Rivetted Joints.

BF 12 : ENVIRONMENTAL STUDIES

UNIT 1

General Concepts : Definition, Scope and importance, need for public awareness, multidisciplinary nature of environmental studies, management of environment.

UNIT 2

Natural Resources : Forest Resources : Use and over-exploitation, deforestation, Water Resources : Use and over-utilization of surface and ground water Mineral Resources : Use and exploitation. Food Resources : World food problem & changes.

UNIT 3

Ecosystems : Concept, structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow, food chain, food webs and ecological pyramids, forest, grassland and desert ecosystem.

UNIT 4

Environmental Pollution : Definition, causes, effects, air, water, soil and noise pollution. Environmental Protection Act. Environmental problem and planning.

UNIT 5

Human Population and the Environment : Population explosion, value education, role of information technology. Visit to a local area to document environmental assets and polluted site – urban / rural / industrial / agriculture etc

COURSE STRUCTURE & SYLLABUS OF BACHELOR OF TECHNOLOGY (B.TECH)

In

Electronics & Telecommunication

Course Structure

Second Year

Third Semester

Paper Code	Subject
BSET1	Mathematics III
BSET2	Principles of Programming
BSET3	Signals and Networks
BSET4	Digital Electronics
BSET5	Electrical Machine

Syllabus

BSET1 : MATHEMATICS III

1. PARTIAL DIFFERENTIATION AND PARTIAL DIFFERENTIAL EQUATION

Introduction, Limit , Partial derivatives , Partial derivatives of Higher orders, Which variable is to be treated as constant, Homogeneous function, Euler's Theorem on Homogeneous Functions, Introduction, Total Differential Coefficient, Important Deductions, Typical cases, Geometrical

Interpretation of $\frac{dz}{dx}$, $\frac{dz}{dy}$, Tangent plane to a surface, Error determination, Jacobians, Properties of

Jacobians, Jacobians of Implicit Functions, Partial Derivatives of Implicit Functions by Jacobian, Taylor's series, Conditions for F(x,y) to be of two variables maximum or minimum, Lagrange's method of undermined Multipliers.

2. PARTIAL DIFFERENTIAL EQUATIONS

Partial Differential Equations, Order, Method of Forming Partial Differential Equations, Solution of Equation by direct Integration, Lagrange's Linear equation, Working Rule, Method of Multipliers, Partial Differential Equations non- Linear in p,q , Linear Homogeneous Partial Diff. Eqn., Rules for finding the complimentary function, Rules for finding the particular Integral, Introduction, Method of Separation of Variables, Equation of Vibrating Strain, Solution of Wave Equation, One Dimensional Heat Flow, Two dimensional Heat Flow.

3. FOURIER SERIES

Periodic Functions, Fourier Series, Dirichlet's Conditions, Advantages of Fourier Series, Useful Integrals, Determination of Fourier constants (Euler's Formulae), Functions defined in two or more sub spaces, Even Functions, Half Range's series, Change of Interval, Parseval's Formula, Fourier series in Complex Form, Practical Harmonic Analysis.

4. LAPLACE TRANSFORMATION

Introduction, Laplace Transform, Important Formulae, Properties of Laplace Transforms, Laplace Transform of the Derivative of $f(t)$, Laplace Transform of Derivative of order n , Laplace Transform of Integral of $f(t)$, Laplace Transform of $t.f(t)$ (Multiplication by t), Laplace Transform of $\frac{1}{t}f(t)$ (Division by t), Unit step function, second shifting theorem, Theorem, Impulse Function, Periodic Functions, Convolution Theorem, Laplace Transform of Bessel function, Evaluation of Integral, Formulae of Laplace Transform, properties of Laplace Transform, Inverse of Laplace Transform, Important formulae, Multiplication by s , Division of s (Multiplication by $1/s$), First shifting properties, second shifting properties, Inverse Laplace Transform of Derivatives, Inverse Laplace Transform of Integrals, Partial Fraction Method, Inverse Laplace Transform, Solution of Differential Equations, Solution of simultaneous equations, Inversion Formulae for the Laplace Transform.

5. NUMERICAL TECHNIQUES

Solution of Ordinary Differential Equations, Taylor's Series Method, Picard's method of successive approximations, Euler's method, Euler's Modified formula, Runge's Formula, Runge's Formula (Third order), Runge's Kutta Formula (Fourth order), Higher order Differential Equations.

6. NUMERICAL METHODS FOR SOLUTION OF PARTIAL DIFFERENTIAL EQUATION

General Linear partial differential equations, Finite-Difference Approximation to Derivatives, Solution of Partial Differential equation (Laplace's method), Jacobi's Iteration Formula, Gauss-Seidal method, Successive over-Relaxation or S.O.R. method, Poisson Equation, Heat equation (parabolic equations), Wave equation (Hyperbolic Equation).

BSET2 : PRINCIPLES OF PROGRAMMING

1. LANGUAGES DESIGN ISSUES

Why Study Programming Languages?, A Short History of Programming Languages – Development of Early Languages; Evolution of Software Architectures; Application Domains, Role of Programming Languages – What makes a Good Languages?; Language Paradigms; Language Standardization; Internationalization, Programming Environments – Effects on Language Design; Environment Frameworks; Job Control and Process Languages, C Overview, Suggestions for Further Reading.

2. IMPACT OF MACHINE ARCHITECTURES

Virtual Computers and Language Implementations, Hierarchies of Virtual Machines, Binding and Binding Time, Java Overview.

3. ELEMENTARY DATA TYPES

Data Objects; Variables; and Constants, Data types, Declarations, Type Checking and Type Conversion, Assignment and Initialization, Numerical Data Types, Enumerations, Booleans, Characters, Character Strings, Pointers and Programmer-Constructed Data Objects, Files and Input-Output.

4. ENCAPSULATION

Structured Data Objects and Data Types, Specification of Data Structure Types, Implementation of Data Structure Types, Declaration and Type Checking for Data Structures, Vectors and Arrays, Records, Lists, Sets, Executable Data Objects, Evolution of the Data Type Concept, Information Hiding, Subprograms as Abstract Operations, Subprogram Definition and Invocation, Subprogram Definitions as Data Objects.

5. INHERITANCE

Abstract Data Types Revisited, Derived Classes, Methods, Abstract Classes, Smalltalk Overview, Objects and Messages, Abstraction Concepts, Polymorphism.

6. SEQUENCE CONTROL

Implicit and Explicit Sequence Control, Sequencing with Arithmetic Expressions – Tree-Structure Representation; Execution-Time Representation, Sequence Control Between Statements – Basic Statements; Structured Sequence Control; Prime Programs.

7. SUBPROGRAM CONTROL

Simple Call-Return Subprograms, Recursive Subprograms, The Pascal Forward Declaration, Names and Referencing Environments, Static and Dynamic Scope, Block Structure, Local Data and Local Referencing Environments, Actual and Formal Parameters, Methods for Transmitting Parameters, Transmission Semantics, Implementation of Parameter Transmission.

BSET3 : SIGNALS & NETWORKS

1. SIGNALS, SYSTEMS AND WAVEFORMS

Signals; Characteristics of Signals; Step, Ramp, and Impulse Functions (Signals); Systems (Types of Networks) --- Linear and NonLinear Network (Systems), Time Invariant and Time Variant Networks, Casual and Non Casual Networks, Passive and Active Networks, Lumped and Distributed Networks.

2. LAPLACE TRANSFORMS

Introduction, Definition of Laplace Transform, Properties of Laplace Transform, Inverse Laplace Transform, Inverse Laplace Transform Using Partial Fraction Expansion, Inverse Laplace Transform Using Convolution Integral.

3. APPLICATIONS OF LAPLACE TRANSFORMS

Introduction, Laplace Transformation For Solving Differential Equations, Application of Laplace Transform for Network Analysis, Definition of System Function, Impulse and Step Response of Networks.

4. NETWORK FUNCTIONS

Driving Point Functions, Transfer Functions, Poles and Zeros, Necessary Conditions.

5. TWO PORT NETWORKS

Introduction, Open Circuit Impedance Parameters or Z-Parameters, Short Circuit Admittance Parameters or Y- Parameters, Hybrid Parameters, Transmission or ABCD Parameters, Interrelationships between the Parameters, Interconnection of Two Port Networks, Input Impedance Interm of Two Port Parameters, Output Impedance Interm of Two Port Parameters.

6. NETWORK TOPOLOGY

Graph of the Network; Graph Theory for Network Analysis ---Network Equilibrium Equations On Loop or KVL Basis, Network Equilibrium Equations On Node or KCL Basis; Network Equilibrium Equations in Matrix Form --- Mesh or Loop or KVL Equilibrium Equations, Node or KCL Equilibrium Equations.

7. DRIVING POINT SYNTHESIS

Synthesis of Networks with Two Kinds of Elements; LC – Driving Point Immittance Functions --- Synthesis of L-C networks; RC Driving Point Immittance Functions ---Synthesis of RC functions; RL Driving Point Immittance Functions --- Note about RL and RC Networks; RLC Network Synthesis.

BSET4 : DIGITAL ELECTRONICS

1. NUMBER SYSTEMS AND CODES:

Binary Number System, Octal Number System, Hexadecimal Number System, Bits and Bytes , 1's and 2's Complements, Decimal -to- Binary Conversion, Decimal-to- Octal Conversion, Decimal – to-Hexadecimal Conversion, Binary –octal and Octal – Binary Conversions , Hexadecimal – Binary and Binary –Hexadecimal Conversion, Hexadecimal –Octal and Octal –Hexadecimal Conversion.

BCD Code, Excess -3 Code , Gray code , Alphanumeric Codes ,Parity Bits, Hamming Code, Floating Point Numbers.

2. BINARY ARITHNETIC:

Basic Rules of Binary , Addition of Larger Bit Binary Numbers, Subtraction of Larger Bit Binary Numbers, Addition Using 2's Complement Method, Subtraction Using 2's Complement Method, Binary Multiplicity –repeated Left Shift and Add Algorithm , Binary Divison – Repeated Right Shift and Subtract Alogrithm.

3. LOGIC GATES AND LOGIC FAMILIES:

Positive and Negative Logic, Truth Tables, Logic Gates, Fan out of Logic Gates, Logic Families, TTL Logic Family, CMOS Logic Family, ECL Logic Family,NMOS AND PMOS Logic Families.

4. BOOLEAN ALGEBRA AND MINIMISATION TECHNIQUES:

Boolean Algebra vs. Ordinary Algebra , Boolean Expressions- Variables and Literals, Boolean Expressions – Equivalent and Complement, Theorems of Boolem Algebra, Minimisation Techniques ,Sum –of – products Booleen Expressions, Quine- Mccluskey Tabular Method, Karnaugh Map Method,Karnaught Maps for Boolean Expressions : With More Than Four Variables.

5. COMBINATIONAL LOGIC CIRCUITS:

Combinational Circuits, Implementating Combinational Logic, Arithmetic Circuits –Basic Building Blocks, Adder- Subtractor, BCD Adder, Carry Propagation- Look Ahead Carry Generator, Arithmetic Logic Unit (ALU), Mulitpliers, Magnitude Comparator, Parity Generator and Checker, De- multiplexers and Decoders, Encoders, Read Only Memory (ROM), Programmable Logic Array (PLA)

6. FLIP FLOPS AND RELATED DEVICES:

R-S Flip Flop , Level Triggered and Edge Triggered Flip Flops, J.K Flip Flop, Master-slave Flip Flops, T-flip Flop, D-flip Flop, Synchronous and Asynchronous Inputs.

7. COUNTERS AND REGISTERS:

Ripple Counter vs. Synchronous Counter, Modulus (or Mod-Number)of a Counter, Propogation Delay in Ripple Counters, Binary Ripple Counters- Operational Principle, Binary Ripple Counters with Modulus Less Than (2^n), Synchronous (or Parallel) Counters, Up/Down Counters, Decade and BCD Counters , Presettable Counters, Shift Register, Serial-in Serial –out Shift Register, Serial –in Parallel-out Shift Register, Parallel – in ,Serial –out Shift Register, Parallel-in , Parallel –out Shift Register, Shift Register Counters- Ring Counter, Shift Counter.

8. SEMI- CONDUCTOR MEMORY:

RAM Architecture, Static RAM (SRAM), Dynamic RAM (DRAM),

BSET5 : ELECTRICAL MACHINES

1 INTRODUCTION

Basic concept of Electrical Engineering; Resistance
Inductance
Capacitance
Resistance connected in series and Parallel
Capacitance connected in series and parallel
Concept of AC/DC currents and AC/DC Voltages,
EMF
Potential difference, Work, Power and Energy.

2 DC NETWORKS

Kirchhoff's Laws,
Node voltage and Mesh current Methods
Delta – Star and Star - Delta Conversion
Superposition principle

Thevenin's and Norton's Theorems

3 TRANSFORMER

Construction and principle of X'Mers
EMF equation
Ideal X'Mer
Shell type & Core type X'Mer
Phasor Diagrams
Equivalent Circuits,
Regulation and Efficiency of X'Mer,
Capacity of X'Mer, and Losses,
Introduction to Auto X'Mer

4 DC MACHINES

Construction and Principle of DC generation and DC Motor,
Back emf of DC Motor,
Types of DC Motor,
Reversal of Direction of Rotation of DC Motor,
Starting of DC Motor,
Characteristics of DC Motor,
Uses of DC Motor, Losses in DC Machine.

5 ALTERNATOR

Construction and Working principle of Alternator,
Application of Alternators.

6 SYNCHRONOUS MOTORS

Principle of Operation,
Application of Synchronous Motors
Comparison between Synchronous Motor and Induction Motors

COURSE STRUCTURE & SYLLABUS OF BACHELOR OF TECHNOLOGY (B.TECH)

In

Electronics & Telecommunication

Course Structure

Second Year

Fourth Semester

Paper Code	Subject
BSET6	Society, Environment, Engineering
BSET7	Electronic Devices & Circuit
BSET8	Analog Electronic Circuit
BSET9	Electromagnetic Engg
BSET10	Electrical Measurement-1

Syllabus

BSET6 : SOCIETY, ENVIRONMENT & ENGINEERING

1.DEFINITION AND SCOPE OF SOCIOLOGY:

Introduction, History of Sociology, Meaning of Sociology, Definition of Sociology, Nature of Sociology, Scope of Sociology, Specialistic OR Formalistic School, Synthetic School of Thought, Conclusion on Scope of Sociology, Differences between Social Sciences and Physical Sciences, Sociology and Other Social Sciences, Sociology and Psychology, Sociology and Anthropology, Sociology and Political Science, Advantages of Study of Sociology, Utility of Study of Sociology to Engineers, Study of Sociology and Democracy, Study of Sociology in India, Methods of Predicting: Preferred and Expected Future.

2. BASIC SOCIOLOGICAL CONCEPT:

Introduction, Society, Basic Characteristics of Society, Factors affecting Social Life of a man, Social factors, Biological factors, External factors, Industrial societies/Technological society, Community, Characteristics of a Community, Comparison between Society and Community, Association, Characteristics of Association, Comparison between Association and Community, Institution, Characteristics of Institution, Significance of Institution, Distinction between Institution and Community, Customs, Difference between Institution and Customs, Customs in Indian Society, Habit, Types of Habits, Difference between Customs and Habits, Folkways, Mores. Distinction between Folkways and Mores, Fashions, Social Utility of Fashion, Factor which cause Fashion to spread in Modern Society, Crowd, Characteristics of Crowd, Theories of Crowd behaviour, Comparison between Crowd and Public, Audience, Mob, Social groups, Classification of Social group, 'Cooley's' classification:- Primary v/s Secondary group, Difference between Primary and Secondary group, Social Structure, Role Systems, Role Conflict and Role Strain, Tribe.

3. SOCIAL INSTITUTION:

Introduction, Types of social institution, Origin of society, Theory of Divine origin, Force theory, Patriarchal and Matriarchal theories, theory of social contract, Organic theory, Group mind theory modern theory, Socialization, Types of socialization process of socialization, Factors responsible to socialization, Advantages of socialization. Family characteristics of a family, classification of family, Functions of family, changing characteristic of modern family, future of family, joint family, characteristics of joint family, Advantages of joint family, Disadvantages of joint family system. Future of joint family, Nuclear family or conjugal family, Marriage forms of marriage, Advantages of monogamy, selection of marriage. Partners. Divorce Reasons for Divorce, Marriage system in India, Hindu marriages Act. Divorce under marriage act 1955. Marriage and family

in India – some recent trends, dowry, how to curb this customs, religion, characteristics of religion, Religion and morality, Distinction between Religion and morality. Education functionalist aspects of Education – Role of social control. Challenges to Education, Reforming Educational system – practical measures to remove illiteracy. Measures to reduce illiteracy – full Literacy, Multiplicity of Language – 3 language formula. Write in diversity.

4.SOCIAL CHANGE

Factors of social change, social movements, Types of social movements. Theories of social change, Resistance to social change. General continues responsible for social change. Causes responsible for opposition to social changes. When are changes favoured ? Conflicts, causes of conflict, forms of conflict, co-operation social advantages of co-operation. Conflict and co-operation, competition, Distinction between competition and conflict, social progress, social invention, social evolution, characteristics of social evolution, difference between social evolution & social progress, social evolution & social change, Effects of conflict in social change, role of sociologists in Promoting social change, Social disorganization, Causes of social disorganization, Symptoms of social disorganization, Difference between social organization and Disorganization.

5.SOCIAL CONTROL:

Social control and self control necessity of social control , means of social control informal means of social control formal methods of Social control . Agencies of social control , person's views about systems, cybernetic communication and control

6. SOCIAL PROBLEMS:

Deviance , social problems classification of social problems, causes of social problems some important social problem , major social problems.

7. CULTURE:

What culture is ? , characteristics of culture. Concept connected with culture characteristics of lag, causes of culture lag , civilization .

Difference between culture and civilization .Acquired behaviour, culture Diffusion.

8. CAPITALISM , MARXISM AND SOCIALISM:

Some important features of capitalism. Advantages of capitalism , Disadvantages of capitalism , communism or Marxism. Basic features of communism, Difference between capitalism of communism , socialism, silent features of socialism. Difference between socialism and communism.

9.SOCIOLOGY AND TECHNICAL CHANGES:

Science and society , Advantages of science and technology in the economic Development , Technology and women , Influence of Technology on social Institutions , Influence of family systems, Demerits, Influence of technology on religion influence of technology on rural life. Influence of Technology on Urban life, social effects of technology, Technology and planning process of nation.

10. HISTORICAL PERSPECTIVE:

Introduction , phases in development of Technology , Science & technology in India after independence . Technology policy statement 1983. Role of Science and technology in development.Super conductivity programme , Instrument development program. Natural resources date management systems , Nuclear power program, Indian space program.Technology. Development in Electronics , Results of planning , science policy resolution of 1958, manpower Development , Impact of Science & Technology in various sectors.

11.TECHNOLOGY ASSESSMENT AND TRANSFER:

Introduction , meaning of Technology Assessment and Transfer what Technology is information Technology , Technology Assessment , Importance of Technology, Technology forecasting and upgradation, Appropriate. Technology , criteria for success of Technology Transfer, Transfer of technology from laboratory to field.

12.CYBERNETICS:

Introduction, what cybernetics is ? control system

13.ENGINEER IN SOCIETY:

Introduction , optimisation , Limitations of optimization , concepts of optimisation . Advantages of optimisation , Methods of optimisation operation research , optimisation of Human Resources . Important of Human Resources , Human Resources planning, Needs and strategies for Human Resources planning, factors affecting manpower planning . Responsibility for Human Resource planning , work rules , wage , factors affecting wages , methods of wage fixation optimum use of capital resources, capital , Types of capital , capitalisation , Banking *Classification of bank*: Credit instruments optimum utilization of material resources , material Handling , Principles & functions of materials Handling material Handling Devices , manual handling , mechanical handling, conveying equipment , Transportation and transferring equipment , Lifting, lowering or elevating equipment , Productivity , Labour productivity, importance of productivity, Benefits of productivity measures of increase of productivity, Automation , formulation of problem , formulation of problems and alternative solution. Strategies, Alternative solution strategies ; The principle of limiting factor, the basic process of Evaluation; maintenance of Public system, Defence & Security requirements.

14.INFLATION AND POVERTY:

Inflation, causes of Inflation in India, measures to control inflation and deflation; poverty, Industrialisation of country; conclusion.

15.ENVIRONMENTAL DEGRADATION AND CONTROL:

Meaning of Environment ; Environment pollution, pollution, classification of pollutants; Effects of pollution on Living systems, causes of Environmental pollution , Kinds of pollution, suggestion for improving , atmospheric pollution , Environmental control monitoring of environmental pollution , Air pollution, classification of air pollutants, sources of Air pollutants, Geographical factors affecting air pollution , Effects of Air pollution ,prevention and control of Air pollution, water pollution, sources of water pollution, Effect of water pollution , water Analysis, waste water; its treatment and Enviroments, waste water treatment , stages of waste , water treatment , treatment and disposal of sewage, treatment of sewage. Industrial waste treatment and Disposal , Treatment of Effluent, Standards for drinking water, water treatment process, some suggestions for reducing water pollution , Role of Engineer in Environmental protection , Ecological imbalance and its Effects,

16.PLANT LAYOUT AND SITE SELECTION:

Introduction , Nature of location decisions, choice of site for location, Urban Area, selection of Site in Rural Area, Suburban Area, Comparison of site for location of facilities , models of location of service facilities, Economic survey for site selection , plant layout , Advantages of good layout , Principles of plant layout, Types of pant layout , Fixed position Layout process layout, product layout, combination layout, Selection of space requirement in layouts.

17. PERSONAL MANAGEMENT:

Defination of personnel management, importance of personnel management,principle of personnel management objectives of personnel management functions of personnel management , Recruitment and selection of employees. Manpower planning ; objectives of manpower planning , Types of manpower planning , steps in manpower planning , Procedure of appointing an employee in a factory , Training and Development, principles of Training ,methods of Training , Industrial safety , Accident Human causes, Effect of accidents, Effect to the Industry , Effect on worker, cost of society, Types of Accidents , Safety procedures.

Ways to prevent or minimize Accidents , Accident reporting and Investigation, Investigation of causes Precautionary measures for maintaining . Industrial Health, Incentives premium OR Incentive Bonus system, Essential s of a Good Incentive systems, Understanding duties of other officials in Department. Duties of Maintenance Engineer. Duties of safety officer, Duties of Security officer.

18.INDUSTRIAL ACTS:

Introduction, Indian Boiler Act 1923, The Indian factories Act 1948, Health provisions. Important provisions of the factory Act regarding safety of workers, welfare provisions , penalties for breach of provisions of the act, Indian Electricity Act, Supply & Use of Energy, The Employee's State Insurance Act 1948, Workmen's compensation Act, The Industrial Dispute Act,1947, Strikes and Lockouts, The payment of wages Act 1936 , The Indian Trade Union Act, 1926 , Minimum Wages Act 1948.

19.STANDARDS:

Indian standard Institution, BIS Publications, ISO-9000 Quality systems.

20.FUNCTIONS OF MANAGEMENT:

Difference between Management , Administration, Organisation, Functions of management , Planning , Production planning and control , steps in production planning and control , Routing procedure of Routing , Scheduling & Loading scheduling and loading , Advantages of planning. Management by objectives, forecasting , Types of forecasting , organizing , meaning of organization,purpose of organizing, Advantages of organization. Classification of organization , Hirarchy systems of organization, Advantages & Disadvantages of scalar systems , Types of organization structures, functional organization, communication objectives of communication, communication process model superior subordinate communication , Types of communication systems , Advantages of oral communication systems , Disadvantages of oral communication systems, written communication, Directing , Nature of Directing, Principles of Direction, controlling , characteristics of Good control systems, co-ordination, Tools of co-ordination, Types of co-ordination,principles of co-ordination, co-ordinationVs co-operation. Motivation Importance of motivation, Techniques of motivation, Methods of participation, Extent of worker's participation in management, worker's participation in Indian Industries, Human needs, Importance of fulfillment of needs, maslow's theory of motivation, Leadership, leadership Style.

BSET7 : ELECTRONIC DEVICES & CIRCUIT

1. MULTI STAGE TRANSISTOR AMPLIFIERS

Introduction, Multi-Stage Transistor Amplifier, Gain Decibel, Frequency Response, Band Width, R-C (Resistance-Capacitance) Coupled Transistor Amplifier), Frequency Response, Transformer Coupled Transistor Amplifiers, Direct - Coupled Amplifiers, Comparison Of Different Types Of Multi-Stage Amplifiers,

2. TRANSISTOR POWER AMPLIFIERS

Introduction, voltage and power amplifiers, comparison of voltage and power amplifiers, process of power amplification, single-ended transistor power amplifier, performance of power amplifiers, classification of power amplifiers, calculations for maximum collector efficiency of a class-a power amplifier, transistor temperature control by heat sinks, collector dissipation curve and its importance, stages of a practical power amplifier, driver stage, complementary-symmetry push-pull amplifier, harmonic distortion in power amplifiers, distortion in push-pull amplifiers

3. FEEDBACK AMPLIFIERS

Introduction, Feedback, Principle Of Negative Feedback In Amplifiers, Gain Of Amplifier With Negative Feedback, Transistor Amplifier Circuit With Negative Voltage Feedback, Feedback Circuit, Negative Feedback Circuits, Transistor Amplifier Circuits With Negative Current Feedback, Circuit Analysis

4. SINUSOIDAL OSCILLATORS

Introduction, sinusoidal oscillator, types of electrical oscillations, transistor oscillator, different types of transistor oscillators, principle of phase shift oscillators, r.c phase shift oscillator, wein bridge oscillator, piezoelectric effect and crystals, characteristics of crystal, transistor crystal oscillator

5. TUNED AMPLIFIERS (RF AMPLIFIERS)

Introduction, classification of tuned amplifiers, merits and limitations of tuned amplifiers, narrow band tuned amplifier, tunability Single tuned capacitance coupled amplifier, tuned power amplifier, tuned class c amplifiers,

6. SWITCHING AND WAVE – SHAPING

Introduction, switching circuit, switch, electronic switch, comparison between electronic and other switches, analysis of switching action of a transistor, multivibrators and their working principle, types of multivibrators, bistable multivibrator, differentiating circuit, wave-shaping by differentiating circuit, integrating circuit, wave-shaping by integrating circuit, voltage multipliers, voltage doubler, voltage tripler, voltage quadrupler, necessity of voltage multipliers, clamping circuits, wave-shaping by various clipping/clamping circuits

7. SPECIAL POWER SUPPLIES

Introduction, transistorized inverter, constant voltage transformer (cvt), construction of cvt, comparison between cvt and stabilizer, comparison among three types of ups systems, three-terminal ic voltage regulators

8. OPERATIONAL AMPLIFIERS

Introduction, operational amplifiers, ideal opamps with feed back (virtual ground), properties of practical op-amps, op-amps as voltage amplifiers, the voltage follower, differential amplifier, op-amp differentiator, practical operational amplifiers

BSET8 : ANALOG ELECTRONIC CIRCUITS

1. BIASING OF BJT

Introduction, Types Of Bjt's, Transistor Terminals, Transistor Action, Transistor Configurations Or Connections, Common-Base (Cb) Configuration, Characteristics Of Cb Configuration, Transistor Configurations Or Connections, Common-Base (Cb) , Configuration, Characteristics Of Cb Configuration, Common-Emitter (Ce) Configuration, Common Collector (Cc) , Configuration, Comparison Of Three Configurations, Ce (Common Emitter) Configuration, Operating Point (Quiescent, Q Or Silent Point), Different Points On The Characteristic, Different Operating Conditions Of A Transistor, Transistor Biasing , Need For Biasing A Transistor, What Happens If A Transistor Is Not Biased , Faithful Amplification, Transistor Biasing, Inherent Variations Of Transistor Parameters, Stabilization, Biasing Circuits, Base Resistor/Fixed Bias Circuit, Biasing With A Feedback Resistor, Emitter Resistance Biasing (Or Self Bias), Voltage (Or Potential) Divider Biasing , Two Battery Bias Stabilisation, Thermal Resistance, Determine Of Operating Point In Presence Of Self Heating, Thermal Stability, Bias Compensation, Design Of biasing Circuits,

2. BIASING OF FET

Introduction, comparison between BJT and FET, field effect transistors (FET), construction of a JEFT (or simply FET), biasing of FET, working principle of an- n- FET, working of a p- FET, static characteristic of FET, FET parameters, FET as an amplifier, FET applications, description of important applications, Biasing the FET basic FET amplifier

3. SMALL SIGNAL BJT AMPLIFIER

Introduction, Single Stage Small Signal Amplifiers, A Practical (Single Stage) Transistor Amplifier Phase Relationship Between Input And Output Of A Transistor Amplifier (Phase Reversal), Analysis Of Transistor Amplifier, Equivalent Circuits Of Transistor Amplifier, Alternative Ac Equivalent Circuits For The Amplifier, Graphical Method (By Drawing Load Lines), Current, Voltage And Power Gains, Hybrid Parameters, Advantages Of Hybrid Parameters, Two-Port Network, Determination Of H-Parameters, Nomenclature Of H-Parameters, Hybrid Model, Performance Of A Transistor In H-Parameters, Limitations Of H-Parameters, Grounded Emitter Circuit, Common Base Amplifier, Grounded Collector Circuit , Comparative Study Of Three Types Of Amplifier Circuits, The Common Emitter Amplifier With Emitter Resistor, Simplified Common Emitter Hybrid Model, Effect Of An Emitter Bypass Capacitor In Low Frequency Response, The Physical Model Of Cb Transistor, Resistor As A Switch

4. SMALL SINGLE FET AMPLIFIER

FET Parameters, JFET As An Amplifier, FET Small Signal Model, Common Source A.C. Amplifier, The Common Drain Or Source Follower, Common Gate Amplifier, General Treatment Of Low Frequency Common Source And Common Drain Amplifier, Common Source Amplifier At High Frequencies, Common Drain Amplifier (Source Follower) At High Frequencies

5. POWER CIRCUITS (RECTIFIER & FILTERS & REGULATORS)

Introduction Semiconductor Diode Rectifiers (Single Phase), Half-Wave (H.W) Rectifiers, Full-Wave (F.W.) Rectifiers, F.W. Bridge Rectifier, Efficiency Of An F.W. Rectifier, Selection Of A Circuit For F.W. Rectification, Ripple Factor, Types Of Filter Circuits, Power Supply Filters; Capacitor Filter, L-Section Filter (Lc Filter), Clc Or π Filter, Zener Diode Voltage Regulator

6. POWER SWITCHING & CONTROL DEVICE

Introduction, Thyristor, Thyristor Family, Working Of An SCR, Two-Transistor Analogy For An SCR, Regeneration, An SCR As A Latch, Vi - Characteristics Of An SCR, SCR Terms, Applications Of SCR, SCR Packages (Packages), Variations Of SCR (Family Of SCR Or Thyristors), Silicon Controlled Switch (SCS), Gate Turn-Off (GTO) Switch, Light Activated SCR (Lascr), Triac, Application Of Triac, Diac, Diac Characteristic, Operation Of Diac, Application Of Diac, UJT (Uni-Junction Transistor), Equivalent Circuit Of UJT, Operating

Characteristic, Latching (Switching) Operation Of UJT, Application Of UJT-Relaxation Oscillator, Frequency Of Sawtooth Waves Generated By Relaxation Oscillator

BSET9 : ELECTROMAGNETIC ENGINEERING

1. COLOMB'S LAW AND ELECTRIC FIELD INTENSITY

The Experimental Law of Coulomb, Electric Field Intensity, Field Due to Continuous Volume Charge Distribution

2. ELECTRIC FLUX DENSITY, GAUSS' LAW, AND DIVERGENCE

Electric Flux Density, Gauss' Law, Applications of Gauss' Law : Some Symmetrical Charge Distributions, Application of Gauss' Law : Differential Volume Element, Divergence, Maxwell's First Equation (Electrostatics), The Vector Operator ∇ and the Divergence Theorem

3. ENERGY AND POTENTIAL

Energy and Potential in a Moving Point Charge in an Electric Field, The Line Integral, Definition of Potential Difference and Potential, The Potential Field of a Point Charge, The Potential Field of a System of Charges : Conservative Property, Potential Gradient, The Dipole, Energy Density in the Electric Field

4. CONDUCTORS, DIELECTRICS, AND CAPACITANCE

Current and Current Density, Continuity of Current, Metallic Conductors, Conductor Properties and Boundary Conditions, The Nature of Dielectric Materials, Boundary Conditions for Perfect Dielectric Materials, Capacitance

5. POISSON'S AND LAPLACE'S EQUATIONS

Poisson's and Laplace's Equations, Uniqueness Theorem, Examples of the Solution of Laplace's Equation, Example of the Solution of Poisson's Equation, Product Solution of Laplace's Equation

6. THE STEADY MAGNETIC FIELD

Ampere's Circuital Law, Magnetic Flux and Magnetic Flux Density, The Scalar and Vector Magnetic Potentials, Derivation of the Steady-Magnetic-Field Laws

BSET10 : ELECTRICAL MEASUREMENTS-I

1. UNITS , SYSTEMS, DIMENSIONS AND STANDARDS

Introduction, Unit, Absolute Units, Fundamental And Derived Units, Dimensions, Dimensions Of Mechanical Quantities, Cgs System Of Units, Practical Units, Rationalised M.K.S.A System, Si Units, Base Units Of Si, Multiplying Prefixes Of Units, Standards And Their Classification, International Standards, Standards For Mass And Length,

2. RESISTANCE MEASUREMENTS OF RESISTANCE.

The Pyrolitic or cracked –carbon resistor, Metal –film resistors, Resistors, Time constant resistors. Measurement of Resistance: Voltmeter Ammeter Method, Substitution Method, Direct Deflection Method, Differential Galvanometer Method, Kohlrausch's Method, Wheatstone Bridge, Working of the bridge, Measurement of high-resistances

3. POTENTIOMETER

Analysis of Potentiometer Circuit, Limitation due to the galvanometer sensitivity, Student Type Potentiometer, Use of potentiometer in the measurement of resistance , voltage and current: Resistance , Measurement of current , Measurement of high voltages

4. A.C.BRIDGES

Sources and detectors. , general form of an a.c. Bridge., measurement of self inductance, maxwell's inductance-capacitance bridge, hay's bridge,. Anderson's bridge, owen's bridge, measurement of capacitance, measurement of mutual inductance, heaviside mutual inductance bridge, campbell's modification of heaviside bridge, heaviside campbell equal ratio bridge,

5. ANALOG AMMETERS, VOLTMETERS AND OHMMETERS

Types of instruments, errors in ammeters and voltmeters, permanent magnet moving coil instrument (pmmc)., ammeter shunts, multi-range ammeters, moving iron (m.i.) Instruments, general torque equation of moving iron instruments, classification of moving iron instruments, shape of scale of moving iron instruments, multipliers for moving iron instruments, comparison between attraction and repulsion types of instruments, errors in moving iron instruments, electrodynamicometer (electrodynamometer) type instruments, operating principle of electrodynamicometer type instrument, construction of electrodynamicometer type instrument, torque equation of electrodynamicometer instruments, hot wire instruments, thermocouple instruments, principle of operation of thermo-electric instruments, electrostatic instruments. , force and torque equations of electrostatic instruments. Rectifier type instruments, rectifier elements, multimeters

6. INSTRUMENT TRANSFORMER

Use of instrument transformers, ratios of instrument transformers, burden of an instrument transformer, current transformers, relationships in a current transformer, errors in current transformers, potential transformers, relationships in a potential transformer, errors in potential transformers, reduction of errors in potential transformers, construction of potential transformers, high voltage potential transformers, protection of potential transformers

7. MEASUREMENT OF NON-ELECTRIC QUANTITIES

Linear Displacement Transducers, Measurement Of Rotary Displacement, Strain Gauges And Measurement Of Strain, Ballast Circuit, Null Type Wheatstone Bridge, Deflection Type Wheatstone Bridges, Gauge Sensitivity, Temperature Compensation, Adjacent Arm Compensating Gauge, Use Of Two Active Gauges In Adjacent Arms, Use Of Our Active Gauges, Poisson's Method, Practical Strain Bridge, Strain Gauge Calibration, Uses Of Strain Gauges, Measurement Of Pressure, Measurement Of Pressure Using Electrical Transducers As Secondary Transducers, Measurement Of Linear Velocity, Moving Magnet Type, Measurement Of Angular Velocity, Electrical Tachometers, Electromagnetic Tachometer Generators, Digital Methods, Photoelectric Tachometer, Toothed Rotor Variable Reluctance Tachometer, Measurement Of Temperature , Measurement Of Resistance Of Thermometers, Salient Features Of Resistance Wire Thermometers, Thermistors.

COURSE STRUCTURE & SYLLABUS OF BACHELOR OF TECHNOLOGY (B.TECH)

In

Electronics and Telecommunication Engineering

Course Structure

Third Year

Fifth Semester

Paper Code	Subject
BTET1	Computer Organisation
BTET2	Control System
BTET3	Digital Communication
BTET4	Semiconductor Devices
BTET5	Digital Image Processing

BTET1 : Computer Organization

1. INTRODUCTION

The Nature Of Computing, The Elements Of Computers, A Turing Machine To Add Two Unary Numbers, The Evolution Of Computers, Electronic Computers, Organization Of A First-Generation Computer, A Nonstandard Architecture: Stack Computers, The Vlsi Era.

2. BASIC ORGANIZATION AT THE COMPUTER

Logic gates, cpu organization

3. ROLE OF OPERATING SYSTEMS AND COMPILERS

Opening remarks, what is an operating system, early history: the 1940s and the 1950s, the 1960s, the emergence of a new field: software engineering , distributed computing, the key architectural trend: parallel computation, input-output trends, open systems, unix, ethical issues, application bases, the key operating systems for the 1990s, compilers, target-language choice

4. INSIDE A CPU

Data representation, fixed-point numbers, floating-point numbers, Number represented, instruction sets, instruction types, risc versus cisc, programming considerations, registers and storage, common bus system

5. COMPUTER ARITHMETIC AND THEIR IMPLEMENTATION

Fixed-point arithmetic, multiplication, twos-complement multipliers, division, division by repeated multiplication, arithmetic-logic units, combinational alus, controller design, introduction, hardwired control, microprogrammed control, the amd 2909 bit-sliced microprogram sequencer , Microinstruction addressing.

6. MEMORY AND IO ACCESS

Ascii alphanumeric characters, input-output interface, i/o bus and interface modules, i/o versus memory bus, asynchronous data transfer, handshaking, asynchronous serial transfer, asynchronous communication interface,

first-in, first-out buffer, modes of transfer, interrupt-initiated i/o, priority interrupt, daisy-chaining priority, priority encoder, interrupt cycle, software routines, initial and final operations, direct memory access (dma), dma controller, dma transfer, input—output processor (iop), keyboard devices, mouse, output devices, sequential and direct-access devices, magnetic disk, types of hard disks, optical disk, optical disk drive

7. INSIDE THE MEMORY

Hierarchical Memory Technology, Random Access Memories (Rams), Bipolar Rams, Static Mos Rams, Dynamic Mos Rams, Inclusion, Coherence, And Locality, Memory Capacity Planning, Virtual Memory Technology, Memory Replacement Policies, Cache Addressing Models, Direct Mapping And Associative Caches, Set-Associative And Sector Caches, Cache Performance Issues

8. INTRODUCTION TO PIPELINED OPERATION AND ARCHITECTURE

General Considerations, Instruction Execution Phases, Mechanisms For Instruction Pipelining, Branch Handling Techniques, Computer Arithmetic Principles, Superscalar And Superpipeline Design, Superscalar Pipeline Design, Superpipelined Design, Supersymmetry And Design Tradeoffs, The Vliw Architecture, Vector And Symbolic Processors, Pipelining Hazards

9. INTRODUCTION TO MULTIPROGRAMMING AND MULTIPROCESSING

Characteristics Of Multiprocessors, Interconnection Structures, Parallel Processing, Multiprocessors, Cluster Computers

10. NON VON NEUMANN ARCHITECTURES

Data flow computers, the genesis of data-flow, interpreting data-flow graphs, static and dynamic data-flow architectures, criticisms of data flow, reduction computer architectures, multiple instruction, single data (systolic architectures)

BTET2 : CONTROL SYSTEM

1 INTRODUCTION TO CONTROL SYSTEM

Classification Of Systems, Open-Loop Control System, Closed-Loop Control Systems, Elements Of Automatic Or Feedback Control System, Requirement Of Automatic Control Systems

2 MATHEMATICAL MODELS OF CONTROL SYSTEM

Representation Of a Control System, Description Of Some Of Typical Physics System, Tachogenerators, Potentiometers, LVDT and Synchros, Synchros, Hydraulic Actuation

3 BASIC PRINCIPLES OF FEEDBACK CONTROL

The Control Objectives, Feedback Control System Characteristics, Proportional Mode Of Feedback Control, Integral Mode Of Feedback Control, Derivative Mode Of Feedback Control

4 TIME DOMAIN ANALYSIS AND FREQUENCY RESPONSE

Standard Test Signals, Static Accuracy, Computation Of Steady State Errors, Transient Response: First Order System, Transient Response: Second Order System, Transient Response Specification, Conclusion, Frequency Response, Frequency Domain Specifications, Magnitude And Phase Angle Characteristics Plot, Frequency Response Specification, Representation Sinusoidal Transfer Function

5 CONCEPTS OF STABILITY AND THE ROUTH STABILITY CRITERION

Bounded-Input Bounded-Output Stability, Zero-Input Stability, The Routh Stability Criterion

6 NYQUIST STABILITY CRITERION

Stability Margin, Phase Margin

7 BODE PLOTS

8 ROOT LOCUS

The transfer function of a second order control system, General Rules

BTET3 : DIGITAL COMMUNICATION

1. ELECTRONIC COMMUNICATION SYSTEM

Introduction, Contaminations, The Audio Spectrum, Signal Power Units, Volume Unit , Signal-To-Noise Ratio, Modulation, Fundamental Limitations In A Communication System, Number Systems

UDE MODULATION

Introduction, definition of am, generation of am wave, double-sideband suppressed-carrier modulation, single-sideband modulation (ssb), vestigial sideband modulation (vsb), demodulation of am.

3. EXPONENTIAL MODULATION1 FREQUENCY MODULATION

Introduction, frequency spectrum of frequency modulation, comparison of fm and am, frequency modulation band widths, narrow band and wide band frequency modulation

(nbfm and wbfm), phase modulation, generation and detection principle, fm demodulation : am-based method.

4. SAMPLING AND ANALOG PULSE MODULATION

Introduction, Sampling Theory, Sampling Analysis, Types Of Sampling, Practical Sampling: Major Problems, Types Of Analog Pulse Modulation, Pulse Amplitude Modulation, Pulse Position Modulation, Signal-To-Noise Ratios In Pulse Systems

5. DIGITAL DATA TRANSMISSION

Introduction, representation of data signal, parallel and serial data transmission, 20ma loop and line drivers, modems, data signal: signal shaping and signaling speed, partial response (correlative) techniques, noise and error analysis, repeaters, digital-modulation systems, amplitude-shift keying (ask), frequency shift keying (fsk), four-phase or quaternary psk, interface standards

6. DIGITAL MODULATION : DM AND PCM

Introduction, delta modulation, pulse code modulation, pcm bandwidth, pcm reception and noise, quantization noise analysis, aperture time, the S/N ratio and channel capacity of pcm, comparison of pcm with other systems, pulse rate, codecs, 24-channel pcm, the pcm channel bank, multiplex hierarchy, measurements of quantization noise, differential pcm

BTET4 : SEMICONDUCTOR DEVICES

1 FIELD EFFECT TRANSISTORS AMPLIFIERS

Advantages and Disadvantages of the FET, Basic Construction of the JFET, Characteristic Curves of the JFET, Principles of Operation of the JFET, Effect of V_{DS} on Channel Conductivity, Channel Ohmic Region and Pinch-Off Region, Characteristic Parameters of the FET, Effect of Temperature on FET, Common-Source AC Amplifier, Fixed Bias with Self-Bias, The Common-Drain or Source Follower, The Common-Gate FET Amplifier, Frequency Response of the FET Amplifier, Other Amplifier Configurations, Summary,

2 MOSFETS AND OTHER APPLICATIONS OF FETS

The Depletion MOSFET, The Enhancement MOSFET, Differences Between JFETs and MOSFETs, Handling Precautions for MOSFETs, Dual-Gate MOSFETs, Integral Gate Protection, Testing Field-Effect Transistors, Application of a Dual-Gate MOSFET in an AGC Amplifier, Other Applications of FETs, The Field-Effect Diode, Summary

3 LINEAR INTEGRATED CIRCUITS: OPERATIONAL AMPLIFIERS

The Operational Amplifier, The Inverting Differential Operational Amplifier, Analog Computer Solution of Linear Equations, Increasing Input Impedance in an Inverting Amplifier, The Noninverting Differential Operational Amplifier, The Differential Amplifier A General Purpose IC Operational Amplifier, Common-Mode Rejection Ratio, Emitter-Coupled Differential Amplifier, High-Performance Operational Amplifier, Increased Differential Input Impedance, Applications of Differential Operational Amplifiers, IC Audio Power Amplifier, Summary.

4 AN INTRODUCTION TO THE FABRICATION OF INTEGRATED CIRCUITS

Evolution of Integrated Circuits, The Monolithic Integrated Circuit, Integrated Circuit Components, Methods of Fabricating Integrated Circuits, Complementary Symmetry MOS Integrated Circuit COS/MOS, Large-Scale Integration (LSI), Summary.

5 NON LINEAR INTEGRATED CIRCUITS I: COMBINATIONAL DIGITAL CIRCUITS

The Binary Concept, Basic Logic Gates, De Morgan's Law, NAND and NOR Logic Gates Comparison of Logic Families, Implementing Logic Circuits with NAND-NOR Gates, The Meaning of Logic Implementation, Summary.

- 6 **NONLINEAR INTEGRATED CIRCUITS II: SEQUENTIAL DIGITAL CIRCUITS**
The Basic R-S Flip-Flop , Clock Pulses , The Clocked R-S Flip-Flop, The Clocked J-K Flip-Flop - DTL, TTL ,The Clocked J-K Flip-Flop - RTL , Other Types of Flip-Flops , Clock Pulse Requirements , The Monostable Multivibrator (One-Shot) , The Schmitt Trigger, Applications of Flip-Flops in Binary Counters, Some Basic Applications of Counters , Summary.
- 7 **OPTOELECTRONIC DEVICES**
Fundamentals of Light, Photoconductive Sensors, Applications of Photodiodes and Phototransistors, Photovoltaic Sensors, Photoemissive Sensors, Light Emitters, Alpha Numeric Displays , Photocouplers, Summary.
- 8 **THYRISTORS AND THE UNIJUNCTION TRANSISTOR**
The Silicon Controlled Rectifier (SCR), The Triac, Triggering Devices, Typical Diac-Triac Phase-Control Circuit, The Unijunction Transistor (UJT), Summary.
- 9 **BASIC CHARACTERISTICS OF THE TRIODE AMPLIFIER**
Triode Construction, Triode Characteristics, Tube Properties, Relationship Between μ , r_p , g_m , Permissible Area of Operation, Operation of the Triode as a DC Amplifier, Theory of Operation of an AC Amplifier: Bias, Gain of an AC Amplifier, Maximum Output Voltage Available from an Amplifier, Use of a Blocking Capacitor, Equivalent Circuit for a Small Signal AC Amplifier - Grounded Cathode, Summary.
- 10 **ANALYSIS OF CLASS A TRIODE AMPLIFIERS**
Evolution of Self Bias, Bypass Capacitor, Grid-Leak Resistor, Determination of Operating Point, Bias Line, AC Load Line, Effect of an AC Load, Effect of Coupling Capacitor, Performance Calculations for a Class A Triode Amplifier, Other Amplifier Configurations, Cathode Follower, Grounded-Grid Amplifier, Summary.

BTET5 : DIGITAL IMAGE PROCESSING

1. CONTINUOUS IMAGE MATHEMATICAL CHARACTERIZATION

Image Representation, Two-Dimensional Systems, Two-Dimensional Fourier Transform, Image Stochastic Characterization

2. PSYCHOPHYSICAL VISION PROPERTIES

Light Perception, Eye Physiology, Visual Phenomena, Monochrome Vision Model, Color Vision Model

3. PHOTOMETRY AND COLORIMETRY

Photometry, Color Matching, Colorimetry Concepts, Tristimulus Value Transformation

4. IMAGE SAMPLING AND RECONSTRUCTION

Image Sampling And Reconstruction Concepts, Image Sampling Systems, Image Reconstruction Systems

5. DISCRETE IMAGE MATHEMATICAL CHARACTERIZATION

Vector-Space Image Representation, Generalized Two-Dimensional Linear Operator, Image Statistical Characterization, Image Probability Density Models, Linear Operator Statistical Representation

6. IMAGE QUANTIZATION

Scalar Quantization, Processing Quantized Variables, Monochrome And Color Image Quantization

7. SUPERPOSITION AND CONVOLUTION

Finite-Area Superposition And Convolution, Sampled Image Superposition And Convolution, Circulant Superposition And Convolution, Superposition And Convolution Operator Relationship

8. UNITARY TRANSFORMS

General unitary transforms, fourier transform, cosine, sine, and hartley transforms, hadamard, haar,

and daubechies transforms, karhunen-loeve transform

9. IMAGE ENHANCEMENT

Contrast Manipulation, Histogram Modification, Noise Cleaning, Edge Crispening, Color Image Enhancement, Multispectral Image Enhancement

10. IMAGE RESTORATION MODELS

General Image Restoration Models, Optical Systems Models, Photographic Process Models, Discrete Image Restoration Models

11. MORPHOLOGICAL IMAGE PROCESSING

Binary Image Connectivity, Binary Image Hit Or Miss Transformations, Binary Image Shrinking, Thinning, Skeletonizing, And Thickening, Binary Image Generalized Dilation And Erosion, Binary Image Close And Open Operations, Gray Scale Image Morphological Operations

12. EDGE DETECTION

Edge, line, and spot models, first-order derivative edge detection, second-order derivative edge detection, edge-fitting edge detection, luminance edge detector performance, color edge detection, line and spot detection

13. IMAGE FEATURE EXTRACTION

Image feature evaluation, amplitude features, transform coefficient features, texture definition, visual texture discrimination

COURSE STRUCTURE & SYLLABUS OF BACHELOR OF TECHNOLOGY (B.TECH)

In

ELECTRONICS & TELECOMMUNICATION

Course Structure

Third Year

Sixth Semester

Paper Code	Subject
BTET6	Power Electronics & Device
BTET7	Digital Signal Processing
BTET8	Micro processor
BTET9	Telecommunication Switching & Signal
BTET10	Industrial Economics & Management

BTET6 : POWER ELECTRONICS AND DEVICES

Chapter 1 : POWER SEMICONDUCTOR DEVICE : Introduction, Thyristorised Power Controllers, Classification Of Power Controllers, Characteristics And Specification Of Power Devices, Comparison Of Power Devices

Chapter 2 : THYRISTOR : Introduction, Modes Of Operation, Dynamic Characteristics, Thyristors Gate Characteristics, Rating And Protection, Firing Circuits, Other Thyristors

Chapter 3 : TURN – OFF METHOD : Introduction, Natural Commutation (Class F : Line Commutation), Forced Commutation, Self Commutation By Resonating Load (Class A), Impulse Commutation (Class D : Auxiliary Voltage Commutation), Complementary Commutation (Class C), External Pulse Commutation (Class E)

Chapter 4 : CONTROLLED RECTIFIERS : Introduction, Principle Of Phase Controlled Converter Operation, Single Phase Semi Converters (Half Bridge Converter), Single Phase Full Converters, Three Phase Half Wave Converters, Three Phase Semiconverters, Three Phase Full Converters

Chapter 5 : INVERTERS : Introduction , Principle, Performance Parameters, Single Phase Bridge Inverter, Voltage Control Of Single Phase Inverters, Harmonic Reduction, Current Source Inverters

Chapter 6 : CHOPPERS : Introduction, Principle Of Step Down Operation, Step Down Chopper With RL Load, Principle Of Step Up Operation, Performance Parameters, Chopper Classification, Effects Of Source And Load Inductance, Applications Of Choppers

Chapter 7 : AC VOLTAGE CONTROLLER : Introduction, Principle Of On – Off Control, Principle Of Phase Control, Single Phase Controller With Resistive Loads (Bidirectional Controllers), Single Phase Controllers With Inductive Loads, Merits, Demerits And Applications Of Ac Voltage Controllers

BTET7 : DIGITAL SIGNAL PROCESSING

Chapter 1 : Introduction : Signal, Systems, and Signal Processing, Classification of Signals, The concept of frequency in continuous-time and discrete-time signals.

Chapter 2 : Discrete-Time Signals and Systems : Discrete-time signals , Analysis of discrete – Time linear time – Invariant systems, Discrete – Time systems described by Difference equations.

Chapter 3 : The Z-Transform and its application to the analysis of LTI Systems : The z-Transform , Properties of the z-Transform, Inversion of the z-Transform, The one-sided z-Transform.

Chapter 4 : Frequency Analysis of signals and systems : Frequency analysis of continuous –time signals , Frequency analysis of discrete-time signals, Properties of the fourier Transform for Discrete-Time signals.

Chapter 5 : The discrete fourier transform : Its properties and applications, Frequency domain sampling The discrete fourier transform, Properties of the DFT,

Chapter 6 : Sampling And Reconstruction Of Signals : Introduction, Representation Of A Continuous-Time Signal By Its Samples: The Sampling Theorem, Sampling With A Zero-Order Hold, Sampling Of Bandpass Signals, Discrete-Time Processing Of Continuous-Time Signals.

BTET8: MICRO- PROCESSOR

1. MICROPROCESSOR ARCHITECTURE AND MICROCOMPUTER SYSTEM

Objectives, the microprocessor is a programmable logic device, designed with registers, flip-flops, and timing elements, memory, r/wm (read/write memory), rom (read-only memory), ee-prom (electrically erasable prom), recent advances in memory technology, input and output (i/o) devices, example of a microcomputer system, review: logic devices for interfacing, examples of latches.

2. 8086 MICROPROCESSOR ARCHITECTURE AND MEMORY INTER-FACING

Objectives, the 8085 mpu, address bus, multiplexed address/data bus, control and status signals, power supply and clock frequency, externally initiated signals, serial i/o ports, the alu, timing and control unit, instruction register and decoder, register array, example of an 8085-based microcomputer, memory interfacing, the 8085 memory system', how does an 8085-based single-board microcomputer work?

3. INTERFACING I/O DEVICES

Objectives, basic interfacing concepts, out instruction (8085), in instruction, interfacing output displays, circuit analysis, program, program description, problem statement, hardware description, seven-segment led, interfacing circuit and its analysis, interfacing input devices, memory-mapped i/o, execution of memory-related data transfer instructions, output port and its address, input port and its address, testing and troubleshooting i/o interfacing circuits, some questions and answers.

4. INTERRUPTS

objectives, the 8085 interrupt, rst (restart) instructions, problem statement, main program, description of the interrupt process, testing interrupt on a single-board computer system, issues in implementing interrupts, 8085 vectored interrupts, trap, rst 7.5, 6.5, and 5.5, triggering levels, pending interrupts, problem statement, hardware description, monitor program, main program, program description, interrupt service routine, restart as software instructions, problem statement, problem analysis, breakpoint subroutine, program discription, additional i/o concepts and processes, 8259a interrupt operation.

5. INTERFACING DATA CONVERTERS

Objective, digital-to-analog (d/a) converters, r/2r ladder network, problem statement, hardware description, program, operating the d/a converter in a bipolar range, hardware description, analog-to-digital (a/d) converters, interfacing an 8-bit a/d converter using status check, hardware description, interfacing circuit, service routine, dual-slope a/d converters.

6. SDK-85 PROGRAMMABLE INTERFACE DEVICES

Objective, basic concepts in programmable devices, data input with handshake, data output with handshake, the 8155/8156 and 8355/8755 multipurpose programmable devices, control logic, the 8155 i/o ports, chip enable logic and port addresses, control word, hardware description, control word, program description, problem statement, control signals in handshake mode, input, output, status word, problem statement, problem analysis, port addresses, program description, interrupt i/o, the 8279 programmable keyboard/display interface, keyboard section, scan section, display section, mpu interface section, circuit description, decoding logic and port addresses, initialization instructions.

7. GENERAL-PURPOSE PROGRAMMABLE PERIPHERAL DEVICE

Objective, the 8255a programmable peripheral interface, control logic, bsr control word, port address, subroutine, problem statement, problem analysis, mode 0: control word, bsr control word for start pulse, subroutine, program description, mode 1: input control signals, control and status words, programming the 8255a in mode 1, mode 1: output control signals, control and status words, problem statement, program description, illustration: interfacing keyboard and seven-segment display, key debounce, illustration : bidirectional data transfer between two microcomputers, data transfer from master mpu to slave mpu, data transfer from slave to master mpu, control word-mode 2, status word-mode 2, read and write operations of the slave mpu, program comments, slave program, The 8254 (8253) Programmable Interval Timer, Data Bus Buffer, Control Logic, Mode, Write Operations, Read Operations, Problem Statement, Mode 0: Interrupt On Terminal Count, Mode 1: Hardware-Triggerable One-Shot, Mode 2: Rate Generator, Mode 3: Square-Wave Generator, Mode 4: Software-Triggered Strobe, Mode 5: Hardware-Triggered Strobe, Read-Back Command, The 8259a Programmable Interrupt Controller, Read/Write Logic, Control Logic, Interrupt Registers And Priority Resolver, Cascade Buffer/Comparator, End Of Interrupt, Additional Features Of The 8259a, Direct Memory Access (Dma) And The 8257 Dma Controller, Dma.Channels, Need For 8212 And Signal Adstb, Signal Aen (Address Enable), Initialization, Dma Execution.

8. SERIAL I/O AND DATA COMMUNICATION

Objectives, Basic concepts in serial i/o, Synchronous vs, Asynchronous transmission, Simplex and duplex transmission, Rate of transmission (baud), Parity check, Checksum, Cyclic redundancy check (crc), Software-controlled asynchronous serial i/o, Serial output data (sod), Serial input data (sid), Hardware-controlled serial i/o using programmable chips, Read/write control logic and registers, Transmitter section, Receiver section, Initializing the 8251a, Program description.

9. MICROPROCESSOR APPLICATION

Objectives, Designing scanned displays, Sn 75491-segment driver, Sn 75492-digit driver, Interfacing a matrix keyboard, Keyboard subroutine, Mm74c923 keyboard encoder, Memory design, Eprom memory, Wait state calculations, 8086 mpu design, Address bus, Data bus, Control signals, Frequency and power requirements, Externally triggered signals, Designing a system: single-board microcomputer, Keyboard, Display, Execute, System buses and their driving capacity, Keyboard and displays, Software design, Program coding, Development and troubleshooting tools, Emulation process, Features of in-circuit emulator, Debugging tools.

10. INTRODUCTION TO 8085 ASSEMBLY LANGUAGE PROGRAMMING

Objectives, the 8085 programming model, registers, accumulator, flags, program counter (pc), stack pointer (sp), instruction classification, data transfer (copy) operations, arithmetic operations, logical operations, branching operations, machine control operations, instruction format, one-byte instructions, two-byte instructions, three-byte instructions

BTET9 : TELECOMMUNICATION SWITCHING AND SIGNAL

Chapter 1: Introduction:

Evolution of Telecommunications, Simple Telephone Communication, Basics of a Switching System, Manual Switching System, Major Telecommunication Network.

Chapter 2: Strowger Switching Systems:

Rotary Dial Telephone, Signalling Tones, Strowger Switching Components, Step-by-step Switching, Design Parameters, 100-line Switching System, 1000-line Blocking Exchange, 10,000 – Line Exchange.

Chapter 3: Crossbar Switching:

Principles of common Control, Touch Tone Dial Telephone, Principles of crossbar Switching, Crossbar Switch Configurations, Crosspoint Technology, Crossbar Exchange Organization.

Chapter 4: Electronic Space Division Switching:

Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-stage Networks, Three-stage Networks, n-Stage Networks.

Chapter 5: Speech Digitization and Transmission:

Sampling, Quantization and Binary coding, Quantization Noise, Companding, Differential Coding, Vocoder, Pulse Transmission, Line Coding, Time division Multiplexing.

Chapter 6: Time Division Switching:

Basic Time Division Space Switching, Basic Time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching.

Chapter 7: Optical Fibre Systems:

Types of Optical Fibres, Fibre Optic Transmission.

Chapter 8: Traffic Engineering :

Network Traffic Load and Parameters, Grade of Service and Blocking Probability, Modelling Switching Systems, Incoming Traffic and Service Time Characterisation, Blocking Models and Loss Estimates, Delay Systems.

Chapter 9: Telephone Networks:

Subscriber Loop Systems, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan.

BTET 10: INDUSTRIAL ECONOMICS AND MANAGEMENT

Chapter 1: Nature and Significance of Economics : Science, Engineering and Technology and their relationship with economics development, appropriate technology for development countries

Chapter 2 : Demand and Supply Analysis : Elasticity, Competition, Monopoly, Oligopoly, Monopolistic competition, Price Discrimination, Equilibrium of firm .

Chapter 3 : Function of Money : Supply and Demand for money, Inflation, Black Money.

Chapter 4: Functions of Commercial Bank : Multiple credit creation, Banking systems in India.

Chapter 5 : Central Banking : Functions of Central Banking, monetary policy.

Chapter 6 : Sources of Public Revenue : Principles of taxation, Direct and Indirect taxes , reform of tax system .

Chapter 7: Theory of International Trade : Balance of trade and payment, Theory of protection, Exchange control, Devaluation.

Chapter 8: New Economics Policy : Liberalization, Extending , Privatization, Globalization, Market- Friendly state, Export led growth.

Chapter 9: Causes of Underdevelopment : Determinants of economic development, stages of economics growth, Strategy of development, Critical minimum effort strategy .

Chapter 10: Management Functions : Developments of management thought, Contribution of F.W. Taylor, Henri Fayol, Elton-Mayo, System Approach to Management .

Chapter 11: Nature of Planning : Decision making process, MBO.

Chapter 12: Organization : Line and Staff relationships, Decentralization of delegation of authority .

Chapter 13: Communication Process : Media Channels and barriers to effective communication .

Chapter 14: Theory of Motivation : Maslow, Herzberg and McGregor Theory of motivation, McClelland's achievement theory.

Chapter 15 : Production Management : Production Planning and control, inventory control, quality control, total quality management.

Chapter 16 : Project Management : Project Development life cycle, project feasibility, CPM, PERT.

Chapter 17: Cost Accounting and Finance : Techniques of Financial Control, Financial Statements Financial Ratios, Break-even analysis, Budgeting and budgetary control.

Chapter 18 : Marketing Functions : Management of Sales and advertising, Marketing research .

Chapter 19: Human Resource Management : Functions, Selection, Training.

Chapter 20 : Engineering Economics : Investment Decisions, Payback time .

COURSE STRUCTURE & SYLLABUS OF BACHELOR OF TECHNOLOGY (B.TECH)

In

ELECTRONICS & TELECOMMUNICATION

Course Structure

Third Year

Sixth Semester

Paper Code	Subject
BTET6	Power Electronics & Device
BTET7	Digital Signal Processing
BTET8	Micro processor
BTET9	Telecommunication Switching & Signal
BTET10	Industrial Economics & Management

BTET6 : POWER ELECTRONICS AND DEVICES

Chapter 1 : POWER SEMICONDUCTOR DEVICE : Introduction, Thyristorised Power Controllers, Classification Of Power Controllers, Characteristics And Specification Of Power Devices, Comparison Of Power Devices

Chapter 2 : THYRISTOR : Introduction, Modes Of Operation, Dynamic Characteristics, Thyristors Gate Characteristics, Rating And Protection, Firing Circuits, Other Thyristors

Chapter 3 : TURN – OFF METHOD : Introduction, Natural Commutation (Class F : Line Commutation), Forced Commutation, Self Commutation By Resonating Load (Class A), Impulse Commutation (Class D : Auxiliary Voltage Commutation), Complementary Commutation (Class C), External Pulse Commutation (Class E)

Chapter 4 : CONTROLLED RECTIFIERS : Introduction, Principle Of Phase Controlled Converter Operation, Single Phase Semi Converters (Half Bridge Converter), Single Phase Full Converters, Three Phase Half Wave Converters, Three Phase Semiconverters, Three Phase Full Converters

Chapter 5 : INVERTERS : Introduction , Principle, Performance Parameters, Single Phase Bridge Inverter, Voltage Control Of Single Phase Inverters, Harmonic Reduction, Current Source Inverters

Chapter 6 : CHOPPERS : Introduction, Principle Of Step Down Operation, Step Down Chopper With RL Load, Principle Of Step Up Operation, Performance Parameters, Chopper Classification, Effects Of Source And Load Inductance, Applications Of Choppers

Chapter 7 : AC VOLTAGE CONTROLLER : Introduction, Principle Of On – Off Control, Principle Of Phase Control, Single Phase Controller With Resistive Loads (Bidirectional Controllers), Single Phase Controllers With Inductive Loads, Merits, Demerits And Applications Of Ac Voltage Controllers

BTET7 : DIGITAL SIGNAL PROCESSING

Chapter 1 : Introduction : Signal, Systems, and Signal Processing, Classification of Signals, The concept of frequency in continuous–time and discrete–time signals.

Chapter 2 : Discrete-Time Signals and Systems : Discrete-time signals , Analysis of discrete – Time linear time – Invariant systems, Discrete – Time systems described by Difference equations.

Chapter 3 : The Z-Transform and its application to the analysis of LTI Systems : The z-Transform , Properties of the z-Transform, Inversion of the z-Transform, The one-sided z-Transform.

Chapter 4 : Frequency Analysis of signals and systems : Frequency analysis of continuous –time signals , Frequency analysis of discrete-time signals, Properties of the fourier Transform for Discrete-Time signals.

Chapter 5 : The discrete fourier transform : Its properties and applications, Frequency domain sampling The discrete fourier transform, Properties of the DFT,

Chapter 6 : Sampling And Reconstruction Of Signals : Introduction, Representation Of A Continuous-Time Signal By Its Samples: The Sampling Theorem, Sampling With A Zero-Order Hold, Sampling Of Bandpass Signals, Discrete-Time Processing Of Continuous-Time Signals.

BTET8: MICRO- PROCESSOR

1. MICROPROCESSOR ARCHITECTURE AND MICROCOMPUTER SYSTEM

Objectives, the microprocessor is a programmable logic device, designed with registers, flip-flops, and timing elements, memory, r/wm (read/write memory), rom (read-only memory), ee-prom (electrically erasable prom), recent advances in memory technology, input and output (i/o) devices, example of a microcomputer system, review: logic devices for interfacing, examples of latches.

2. 8086 MICROPROCESSOR ARCHITECTURE AND MEMORY INTER-FACING

Objectives, the 8085 mpu, address bus, multiplexed address/data bus, control and status signals, power supply and clock frequency, externally initiated signals, serial i/o ports, the alu, timing and control unit, instruction register and decoder, register array, example of an 8085-based microcomputer, memory interfacing, the 8085 memory system', how does an 8085-based single-board microcomputer work?

3. INTERFACING I/O DEVICES

Objectives, basic interfacing concepts, out instruction (8085), in instruction, interfacing output displays, circuit analysis, program, program description, problem statement, hardware description, seven-segment led, interfacing circuit and its analysis, interfacing input devices, memory-mapped i/o, execution of memory-related data transfer instructions, output port and its address, input port and its address, testing and troubleshooting i/o interfacing circuits, some questions and answers.

4. INTERRUPTS

objectives, the 8085 interrupt, rst (restart) instructions, problem statement, main program, description of the interrupt process, testing interrupt on a single-board computer system, issues in implementing interrupts, 8085 vectored interrupts, trap, rst 7.5, 6.5, and 5.5, triggering levels, pending interrupts, problem statement, hardware description, monitor program, main program, program description, interrupt service routine, restart as software instructions, problem statement, problem analysis, breakpoint subroutine, program discription, additional i/o concepts and processes, 8259a interrupt operation.

5. INTERFACING DATA CONVERTERS

Objective, digital-to-analog (d/a) converters, r/2r ladder network, problem statement, hardware description, program, operating the d/a converter in a bipolar range, hardware description, analog-to-digital (a/d) converters, interfacing an 8-bit a/d converter using status check, hardware description, interfacing circuit, service routine, dual-slope a/d converters.

6.

SDK-85 PROGRAMMABLE INTERFACE DEVICES

Objective, basic concepts in programmable devices, data input with handshake, data output with handshake, the 8155/8156 and 8355/8755 multipurpose programmable devices, control logic, the 8155 i/o ports, chip enable logic and port addresses, control word, hardware description, control word, program description, problem statement, control signals in handshake mode, input, output, status word, problem statement, problem analysis, port addresses, program description, interrupt i/o, the 8279 programmable keyboard/display interface, keyboard section, scan section, display section, mpu interface section, circuit description, decoding logic and port addresses, initialization instructions.

7. GENERAL-PURPOSE PROGRAMMABLE PERIPHERAL DEVICE

Objective, the 8255a programmable peripheral interface, control logic, bsr control word, port address, subroutine, problem statement, problem analysis, mode 0: control word, bsr control word for start pulse, subroutine, program description, mode 1: input control signals, control and status words, programming the 8255a in mode 1, mode 1: output control signals, control and status words, problem statement, program description, illustration: interfacing keyboard and seven-segment display, key debounce, illustration : bidirectional data transfer between two microcomputers, data transfer from master mpu to slave mpu, data transfer from slave to master mpu, control word-mode 2, status word-mode 2, read and write operations of the slave mpu, program comments, slave program, The 8254 (8253) Programmable Interval Timer, Data Bus Buffer, Control Logic, Mode, Write Operations, Read Operations, Problem Statement, Mode 0: Interrupt On Terminal Count, Mode 1: Hardware-Triggerable One-Shot, Mode 2: Rate Generator, Mode 3: Square-Wave Generator, Mode 4: Software-Triggered Strobe, Mode 5: Hardware-Triggered Strobe, Read-Back Command, The 8259a Programmable Interrupt Controller, Read/Write Logic, Control Logic, Interrupt Registers And Priority Resolver, Cascade Buffer/Comparator, End Of Interrupt, Additional Features Of The 8259a, Direct Memory Access (Dma) And The 8257 Dma Controller, Dma.Channels, Need For 8212 And Signal Adstb, Signal Aen (Address Enable), Initialization, Dma Execution.

8. SERIAL I/O AND DATA COMMUNICATION

Objectives, Basic concepts in serial i/o, Synchronous vs, Asynchronous transmission, Simplex and duplex transmission, Rate of transmission (baud), Parity check, Checksum, Cyclic redundancy check (crc), Software-controlled asynchronous serial i/o, Serial output data (sod), Serial input data (sid), Hardware-controlled serial i/o using programmable chips, Read/write control logic and registers, Transmitter section, Receiver section, Initializing the 8251a, Program description.

9. MICROPROCESSOR APPLICATION

Objectives, Designing scanned displays, Sn 75491-segment driver, Sn 75492-digit driver, Interfacing a matrix keyboard, Keyboard subroutine, Mm74c923 keyboard encoder, Memory design, Eprom memory, Wait state calculations, 8086 mpu design, Address bus, Data bus, Control signals, Frequency and power requirements, Externally triggered signals, Designing a system: single-board microcomputer, Keyboard, Display, Execute, System buses and their driving capacity, Keyboard and displays, Software design, Program coding, Development and troubleshooting tools, Emulation process, Features of in-circuit emulator, Debugging tools.

10. INTRODUCTION TO 8085 ASSEMBLY LANGUAGE PROGRAMMING

Objectives, the 8085 programming model, registers, accumulator, flags, program counter (pc), stack pointer (sp), instruction classification, data transfer (copy) operations, arithmetic operations, logical operations, branching operations, machine control operations, instruction format, one-byte instructions, two-byte instructions, three-byte instructions

BTET9 : TELECOMMUNICATION SWITCHING AND SIGNAL

Chapter 1: Introduction:

Evolution of Telecommunications, Simple Telephone Communication, Basics of a Switching System, Manual Switching System, Major Telecommunication Network.

Chapter 2: Strowger Switching Systems:

Rotary Dial Telephone, Signalling Tones, Strowger Switching Components, Step-by-step Switching, Design Parameters, 100-line Switching System, 1000-line Blocking Exchange, 10,000 – Line Exchange.

Chapter 3: Crossbar Switching:

Principles of common Control, Touch Tone Dial Telephone, Principles of crossbar Switching, Crossbar Switch Configurations, Crosspoint Technology, Crossbar Exchange Organization.

Chapter 4: Electronic Space Division Switching:

Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-stage Networks, Three-stage Networks, n-Stage Networks.

Chapter 5: Speech Digitization and Transmission:

Sampling, Quantization and Binary coding, Quantization Noise, Companding, Differential Coding, Vocoder, Pulse Transmission, Line Coding, Time division Multiplexing.

Chapter 6: Time Division Switching:

Basic Time Division Space Switching, Basic Time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching.

Chapter 7: Optical Fibre Systems:

Types of Optical Fibres, Fibre Optic Transmission.

Chapter 8: Traffic Engineering :

Network Traffic Load and Parameters, Grade of Service and Blocking Probability, Modelling Switching Systems, Incoming Traffic and Service Time Characterisation, Blocking Models and Loss Estimates, Delay Systems.

Chapter 9: Telephone Networks:

Subscriber Loop Systems, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan.

BTET 10: INDUSTRIAL ECONOMICS AND MANAGEMENT

Chapter 1: Nature and Significance of Economics : Science, Engineering and Technology and their relationship with economics development, appropriate technology for development countries

Chapter 2 : Demand and Supply Analysis : Elasticity, Competition, Monopoly, Oligopoly, Monopolistic competition, Price Discrimination, Equilibrium of firm .

Chapter 3 : Function of Money : Supply and Demand for money, Inflation, Black Money.

Chapter 4: Functions of Commercial Bank : Multiple credit creation, Banking systems in India.

Chapter 5 : Central Banking : Functions of Central Banking, monetary policy.

Chapter 6 : Sources of Public Revenue : Principles of taxation, Direct and Indirect taxes , reform of tax system .

Chapter 7: Theory of International Trade : Balance of trade and payment, Theory of protection, Exchange control, Devaluation.

Chapter 8: New Economics Policy : Liberalization, Extending , Privatization, Globalization, Market- Friendly state, Export led growth.

Chapter 9: Causes of Underdevelopment : Determinants of economic development, stages of economics growth, Strategy of development, Critical minimum effort strategy .

Chapter 10: Management Functions : Developments of management thought, Contribution of F.W. Taylor, Henri Fayol, Elton-Mayo, System Approach to Management .

Chapter 11: Nature of Planning : Decision making process, MBO.

Chapter 12: Organization : Line and Staff relationships, Decentralization of delegation of authority .

Chapter 13: Communication Process : Media Channels and barriers to effective communication .

Chapter 14: Theory of Motivation : Maslow, Herzberg and McGregor Theory of motivation, McClelland's achievement theory.

Chapter 15 : Production Management : Production Planning and control, inventory control, quality control, total quality management.

Chapter 16 : Project Management : Project Development life cycle, project feasibility, CPM, PERT.

Chapter 17: Cost Accounting and Finance : Techniques of Financial Control, Financial Statements Financial Ratios, Break-even analysis, Budgeting and budgetary control.

Chapter 18 : Marketing Functions : Management of Sales and advertising, Marketing research .

Chapter 19: Human Resource Management : Functions, Selection, Training.

Chapter 20 : Engineering Economics : Investment Decisions, Payback time .

COURSE STRUCTURE & SYLLABUS OF BACHELOR OF TECHNOLOGY (B.TECH)

In

Electronics & Telecommunication

Course Structure

Fourth Year

Seventh Semester

Syllabus

Elective – I

Paper Code	Name of the Subject
BEET5-I	Opto Electronics & Photonics – I
BEET5-II	Digital Voice picture Communication
BEET5-III	Radar System
BEET5-IV	Optical Fiber Communication

BEET 5-I- OPTO ELECTRONICS & PHOTONICS – I

1. ELEMENTAL AND COMPOUND SEMICONDUCTORS

Introduction, Bonding in Solids, Crystalline Nature of Solids, Alloy Semiconductors, Lattice-Mismatched and Pseudomorphic Materials, Transmission Media and Choice of Materials, Crystal Growth, Device Processing

2. ELECTRONIC PROPERTIES OF SEMICONDUCTORS

Introduction, Carrier Effective Masses and Bandstructure, Effect of Temperature and Pressure on Bandgap, Carrier Scattering Phenomena, Semiconductor Statistics, Conduction Processes in Semiconductors, Bulk and Surface Recombination Phenomena

3. OPTICAL PROCESSES IN SEMICONDUCTORS

Electron-Hole Pair Formation and Recombination, Absorption in Semiconductors, Effect of Electric Field on Absorption: Franz-Keldysh and Stark Effects, Absorption in Quantum Wells and the Quantum-Confined Stark Effect, The Kramers-Kronig Relations, Radiation in Semiconductors, Deep Level Transitions, Auger Recombination, Luminescence from Quantum Wells, measurement of Absorption and Luminescence Spectra, Time-Resolved Photoluminescence

4. JUNCTION THEORY

Introduction, P-N Junctions, Schottky Barriers and Ohmic Contacts, Semiconductor Heterojunctions
Chapter Highlights

5. LIGHT EMITTING DIODES

Introduction, The Electroluminescent Process, Choice of LED Materials, Device Configuration and Efficiency, Light Output from LED, LED Structures, Device Performance characteristics, Frequency Response and Modulation Bandwidth, Manufacturing Process and Applications

BEET 5-II- DIGITAL VOICE PICTURE COMMUNICATION

1. RADIO RECEIVERS

Trf and Superheat receivers, AM broadcast receivers, Communication Receivers, Tuning Indicator, Diversity reception, FM receivers.

2. NOISE

Introduction, External noise, Internal noise, Noise in Communication system, Noise in AM, FM, and PM system, Noise in pulse modulated systems.

3. PROPAGATION OF WAVES

Reflection/ refraction of radio waves, Atmospheric absorption – Tropospheric Scatter, Ionospheric Layers, Sky Waves, Virtual Height, Regular & irregular ionospheric variations, Skip distance, Primary & Secondary Service Area.

4. BROAD BANK COMMUNICATIONS

Time division multiplexing, Frequency Division multiplexing, Computer Communication System, Microwave Links, Line of Sight (LOS) links, Tropospheric Links, Satellite Communications – Choice of Orbit FDMA, TDMA, SPADE, Optical Communications – Modulation and Detection, Integrated service digital network (ISDN).

5. PICTURE-SIGNAL TRANSMISSION AND RECEPTION

Facsimile-transmission and reception, Television-scanning process, CCIR-B standards, TV camera systems – image orthicon and vidicon – transmission and reception principle for black and white TV signals, Principle of color TV – primary colours, colour TV systems – NTSC, SECAM, PAL, Transmission and reception using PAL system, PIL Picture tube.

6. RECORDING AND DIGITAL PROCESSING OF VIDEO SIGNALS

Basic Video recording principles, Recording of luminance signals, Recording of Chrominance signal, Frequency range of the VHS signal, Tape loading, Tape format in VHS systems, Operating modes of a video cassette recorder, E-E mode, Playback mode, Digital processing of Video Signals, How much digital is the Digital TV? Video processor, Audio Processing, Control Computer, CD Players

BEET 5-III- RADAR ENGINEERING – I

1. AN INTRODUCTION TO RADAR

Basic Radar , The Simple Form of the Radar Equation, Radar Block Diagram, Radar Frequencies, Application of Radar, The Origins of Radar

2. THE RADAR EQUATION

Introduction, Detection of Signals in Noise, Receiver Noise and the Signal-to-Noise Ratio, Probability Density Functions, Probabilities of Detection and False Alarm, Integration of Radar Pulses, Radar Cross-Section Fluctuations, Transmitter Power, Pulse Repetition Frequency, Antenna Parameters, System Losses, Other Radar Equation Considerations

3. MTI AND PULSE DOPPLER RADAR

Introduction to Doppler and MTI Radar, Delay-Line Cancelers, Staggered Pulse Repetition Frequencies, Doppler Filter Banks, Digital MTI Processing, Moving Target Detector, Limitations to MTI Performance, MTI from a Moving Platform (AMTI), Pulse Doppler Radar, Other Doppler Radar Topics

4. TRACKING RADAR

Tracking with Radar, Monopulse Tracking, Conicla Scan and sequential Lobing, Limitations to Tracking Accuracy, Low-Anle Tracking, Tracking in Range, Other Tracking Radar Topics, Comparison of Trackers, Automatic Tracking with Surveillance Radars (ADT)

5. DETECTION OF SIGNALS IN NOISE

Introduction, Matched-Filter Receiver, Detection Criteria, Detectors, Automatic Detection, Integrators, Constant-False-Alarm Rate Receivers, The Radar Operator, Signal Management

6. INFORMATION FROM RADAR SIGNALS

Introduction, Basic Radar Measurements, Theoretical Accuracy of Radar Measurements, Ambiguity Diagram, Pulse Compression, Target Recognition

BEET 5-IV- OPTICAL FIBER COMMUNICATION

1 .. ELEMENTARY DISCUSSION OF PROPAGATION IN DIELECTRIC WAVEGUIDES

Introduction, Step-index fibers: numerical aperture and multi path dispersion, Propagation and multipath dispersion in graded-index fibers, Modes and rays, The slab waveguide

2 MATERIAL DISPERSION

Refractive index: theory, The refractive indices of bulk media: experimental values, Time dispersion in bulk media, The wavelength of minimum dispersion

3 ATTENUATION MECHANISMS IN OPTICAL FIBERS

Introduction, Absorption, Scattering, Other very low-loss materials, All-plastic and polymer-clad-silica (PCS) fibers, Damage by ionizing radiation

4 SYSTEM CONSIDERATIONS

The optimum wavelength for silica fibers, The ultimate bandwidth limitation, A comparison between optical fibers and conventional electrical transmission lines

5 SINGLE-MODE FIBERS

Types of single-mode fiber, Mode spot size, HE₁₁ mode propagation characteristics

6 THE FABRICATION OF FIBERS, CABLES AND PASSIVE COMPONENTS

Fiber production methods, Fiber strength, Cables, Splices and connectors

7 FIBER PARAMETERS: SPECIFICATION AND MEASUREMENT

Introduction, The refractive-index profile, Near- and far-field intensity distributions, Attenuation measurements, Bandwidth measurements, Cutoff wavelength

8 THE DESIGN OF LEDS FOR OPTICAL COMMUNICATION

The external quantum efficiency, The Burrus-type double heterostructure surface-emitting LED (DH-SLED), The stripe-geometry, edge-emitting LED (ELED), LED-to-fiber launch efficiency, Lensed LED-to-fiber launch systems, LED designs

9 SEMICONDUCTOR LASERS

The theory of laser action in semiconductors, Some simplified calculations, Modulation frequency response, Noise in semiconductor lasers

10 SEMICONDUCTOR LASERS FOR OPTICAL FIBER COMMUNICATION SYSTEMS

Introduction, Methods for obtaining the stripe geometry, Optical and electrical characteristics of Fabry-Perot lasers, Spectral characteristics, Power and voltage characteristics, Quantum-well lasers and laser arrays, Single frequency semiconductor lasers, The reliability of DH semiconductor LEDs and lasers, The transmitter module

11 THE RECEIVER AMPLIFIER

Introduction, Sources of receiver noise, Circuits, devices and definitions, Signal-to-noise ratio in the voltage amplifier circuit, Signal-to-noise ratio in the transimpedance feedback amplifier, The ideal quantum-limited receiver, Amplifier design examples

12 THE REGENERATION OF DIGITAL SIGNALS

Causes of regeneration error, The quantum limit to detection, The effect of amplifier noise and thermal noise on

the error probability, Noise penalties in practical system

13 OPTICAL FIBER COMMUNICATION SYSTEMS

Introduction, The economic merits of optical fiber systems, Digital optical fiber telecommunication systems,
Data communication networks, Analog systems, The optical ether

COURSE STRUCTURE & SYLLABUS OF BACHELOR OF TECHNOLOGY (B.TECH)

***In* Electronics & Telecommunication**

Course Structure Fourth Year

VIII Semester

Paper Code	Name of the Subject
BEET6	VLSI Technology & Process Modeling
BEET7	Satellite Communication System
BEET8	Semiconductor device and modeling
BEET9	Project
BEET6P	VLSI Technology & Process Modeling Practical

Syllabus

BEET 6 VLSI TECHNOLOGY & PROCESS MODELING

1. A REVIEW OF MICROELECTRONICS AND AN INTRODUCTION TO MOS TECHNOLOGY

Introduction to integrated circuit technology, The integrated circuit (IC) era, Metal-oxide-semiconductor (MOS) and related VLSI technology, Basic MOS transistors, Enhancement mode transistor action, Depletion mode transistor action, Depletion mode transistor action, nMOS fabrication, CMOS fabrication, Thermal aspects of processing, BiCMOS technology, Production of E-beam masks.

2. SUBSYSTEM DESIGN AND LAYOUT

Switch logic, Gate (restoring) logic – The inverter; Two-input nMOS; CMOS and BiCMOS Nand Gates; Two-input nMOS, CMOS and BiCMOS Nor Gates; Other forms of CMOS logic, Examples of structured design (combinational logic) – A parity generator; Bus arbitration logic for n-line bus; Multiplexers (data selectors); A general logic function block; A four-line Gray code to binary code converter; The programmable logic array (PLA), Some clocked sequential circuits – Two-phase clocking; Charge storage; Dynamic register element; A dynamic shift register.

3. SUBSYSTEM DESIGN PROCESSES

Some general considerations, An illustration of design processes – The general arrangement of a 4-bit arithmetic processor; The design of a 4 – bit Shifter, Observations.

4. SOME CMOS DESIGN PROJECTS

Introduction to project work, CMOS project 1 – an incrementer / decremter, CMOS project 2 – left / right shift serial / parallel register, CMOS project 3 – a comparator for two n-bit numbers , CMOS/BiCMOS project 4 – a two-phase non-overlapping clock generator with buffered output on both phases, CMOS projects 5 – design of a ϕ latch – an event-driven latch element for EDL systems.

5. ULTRA-FAST VLSI CIRCUITS AND SYSTEMS – INTRODUCTION TO GAAS TECHNOLOGY

Ultra-fast systems, Gallium arsenide crystal structure, Technology Development, Device modeling and performance estimation, MESFET-based design, GaAs MESFET classes of logic.

BEET7: SATELLITE COMMUNICATION SYSTEM

1. PRINCIPLES OF SATELLITE COMMUNICATIONS:

Evolution and Growth of Communication Satellite, Synchronous Satellite, International Regulation and Frequency Co-ordination, Satellite Frequency Allocation and Band Spectrum, General and Technical Characteristics of a Satellite Communication System, Advantages of Satellite Communication, Active and

Passive Satellite , Advent of Digital Satellite Communication, Modem and Codec, Review Questions, Reference.

2. DIGITAL SATELLITE TRANSMISSION:

Advantages of Digital Communication, Byte, Baud , Elements of Digital Satellite Communication Systems, Digital Base band Signals, Digital Modulation Techniques, Satellite Digital Link Design, Time Division Multiplexing , UST, 24- Channel System, Review Questions, Reference.

3. MULTIPLE ACCESS TECHNIQUES:

Introduction, Time Division Multiple Access (TDMA), TDMA, Frame Structures, TDMA Burst Structures, TDMA Frame Efficiency, TDMA Super frame, TDMA Frame Acquisition and Synchronization, TDMA Compared to FDMA, TDMA Burst Time Plan, Multiple Beam (Satellite Switched) TDMA Satellite Systems, Beam Hopping (Transponder Hopping) TDMA, Code Division Multiple Access (CDMA) and Hybrid Access Techniques, Suggested References, Review Questions.

4. DEMAND ASSIGNMENT MULTIPLE ACCESS TECHNIQUES:

Introduction , Erlang call congestion (Blocking or B) Formula, Demand Assignment Control , DA- FDMA (Spade) System, Demand Assignment TDMA (DATDMA) Digital Speech Interpolation, Review Questions, References.

5. SPREAD SPECTRUM TECHNIQUE AND CODE DIVISION MULTIPLE ACCESS:

Introduction , Process Gain and Jam Margin, J/S Ratio and Antijam Margin, Direct Sequence Spread Spectrum Techniques , PN Sequence, DS- CDMA, Frequency Hopping Spread Spectrum Communication System (FM-SS), Frequency Hopping Spread Spectrum Code- Division Multiple Access (FH-SS-CDMA), Synchronization, Application of Spread Spectrum Techniques, Hybrid Systems, Review Questions.

6. SATELLITE ORBITS AND INCLINATION:

Introduction, Synchronous Orbit, Orbital Parameters, Satellite Location With Respect to the Earth , Look Angles, Earth Coverage and Slant Range, Eclipse Effects, Satellite Placement in Geostationary Orbit, Station Keeping, Satellite Stabilization, Review Questions, References.

7. COMMUNICATION SATELLITE SUBSYSTEMS:

Introduction, Electric Power Supply, Attitude and Orbit Control , Propulsion Sub System, Repeaters, Antenna Systems, Telemetry , Tracking and Command (TTC) Subsystem, Thermal Control System, Structure Subsystem, Reliability of Satellite Subsystems, Review Questions, References.

8. SATELLITE EARTH STATIONS:

Introduction, Earth Station Design Requirement, Earth Station Subsystems, Monitoring and Control, Frequency Coordination , Small Earth Station, Very Small Aperture Terminals (VSATs), Mobile and Transport Earth Stations, Earth Stations in Near Future, TVRO Systems (Television Receive Only Systems), Review Questions, References.

9. SATELLITE AND CABLE TRANSMISSION SYSTEMS:

Introduction, Cable Channel Frequencies, Head- End Equipment, Distribution of the Signal , Important Cable Television Network Specifications, Network Architecture, Optical Fiber CATV Systems, Indian Perspective, Future of Cable TV Systems, Reference.

10. SPEECH CODING TECHNIQUES:

Introduction, Some Facts about Speech, Digital Speech Quality and International Digital Telephony Standards, Basic Speech Coding Methods, Low Bit Rate Speech Coding, Audio Coding, Hardware Technology in Speech Coding, Speech Coder Performance.

Semiconductor device and modeling

BEET8 : SEMICONDUCTOR DEVICES AND MODELING

1. BASIC SEMICONDUCTOR PHYSICS

Introduction, Solis-state Structure, Band Structure, Electrons and Hole: Semiconductor Statistics, Intrinsic; Extrinsic and Compensated Semiconductors, Electron and Hole Mobility's and Drift Velocities, Hall Effect and Magnetoresistance.

2.P-N JUNCTIONS, SCHOTTKY BARRIER JUNCTIONS, HETEROJUNCTIONS AND OHMIC CONTACTS

Introduction, p-n Junction Under Zero Bias Condition, Current Voltage Characteristics of an Ideal p-n Junction (The Diode Equation), Tunneling and Tunnel Diodes, Junction Breakdown – Breakdown Mechanisms; Impact Ionization and Avalanche Breakdown, Schottky Barriers, Current Voltage Characteristics of Schottky Diodes – Thermionic Emission Model; Current Voltage Characteristics: Thermionic Field Emission & Field Emission; Small-Signal Circuit of a Schottky Diode

3. BIPOLAR JUNCTION TRANSISTORS

Principle of Operation, Minority Carrier Profiles in a Bipolar Junction Transistor, Current Components and Current Gain, Base Spreading Resistance and Emitter Current Crowding in Bipolar Junction Transistor, Effects of Non-Uniform Doping in the Base Region: Graded Base Transistors, Output Characteristics of Bipolar Junction Transistors and Early effect, Ebers-Moll Model, Bipolar Junction Transistor as a Small Signal Amplifier: Cutoff Frequencies, Bipolar Junction Transistor as a Switch, Bipolar Junction Transistors in Integrated Circuits.

4. FIELD EFFECT TRANSISTORS

Introduction, Surface Charge in Metal Oxide Semiconductor Capacitor, Capacitance-Voltage Characteristics of an MIS Structure, Metal Oxide Semiconductor Field-Effect Transistors (MOSFETs), Velocity Saturation Effects in MOSFETs, Short Channel and Nonideal Effects in MOSFETs, Subthreshold Current in MOSFETs, MOSFET Capacitances and Equivalent Circuit, Enhancement-and Depletion-Mode MOSFETs Complementary MOSFETs (CMOS) and Silicon on Sapphire, Metal Semi-conductor Field-Effect Transistors.

BEET9

Project Guideline

Thinking up a Project

You are expected to come up with your own idea for a project. A wide range of topics is acceptable so long as there is substantial computing content and project is predominantly of a practical, problem-solving nature. You might take up an interest which you already have in your stream of engineering. You may do your project in any reputed organization or a department. Individually or a group of maximum 4 students can take up a project. The project is a vehicle for you to demonstrate the required level of competence in your chosen field of Bachelors.

Start thinking about your project right in the beginning. If you want to do the project in industrial environment start your correspondence fairly early to find an organization, which is ready to accept you. You must submit an outline of your project (two or three pages) to your guide within one month of start of the project work. This must include the Title, Objective, Methodology (main steps to carry out a project), expected output and organization where you intend to carry out the project.

Arranging a Guide

When you have an idea of your project, even a tentative one, approach a suitable person who has interest and expertise in that area. The Guide may be a person with M.E. / M.Tech or a B.E./ B.Tech having a working experience of 3 years in relevant field.

Working with the Guide

The Guide's role is to provide support and encouragement to direct the student's attention to relevant literature, to provide technical assistance occasionally, to read and comment on the draft report and to give guidance on the standard and amount of work required. The Guide is not responsible to teach any new skills and language required for project work or for arranging any literature or equipment. . Rest you can workout your own arrangement. The students, who are content to carry out their work largely without supervision, should keep their Guide in touch with what they are doing. A student should not remain silent for months and then appear with a complete project work unknown to supervisor. In such circumstances, the Guide cannot be counted on to give an automatic seal of his approval. If a project produces a piece of software, the Guide would normally expect to see a demonstration of the software in action.

The main purpose of the report is to explain what you did in your project. The reader should be able to see clearly what you set out to do and what you achieved. It should describe the problem addresses and explain why you tackled it in the way you did. It should include your own assessment of how successful the project was.

Resist temptation to include pages of padding. If the project consists of developing an application in area with which a computer scientist would not be familiar – such as chemical testing, stock & shares – it might be necessary to include some explanatory company/ organization profile for whom you have done the work must not appear in chapters and must go to appendix part.

The work that is presented for examiners should be your own. The presentation of another person's work, design or program as though they are your own is a serious examination offence. Direct quotation from the work of others (published or unpublished) must always be clearly identified as such by being placed in quotation marks, it is essential that reader should be able to see where the other work ends and your begins.

Sometimes a project containing good work is marred by a report, which is turgid, obscure and simply ungrammatical. In such cases, it is very difficult to find out the work done during the project. An examiner cannot be kind enough to look properly on a project that is almost unreadable.

important points for carrying out a project

- The organizations or companies offer you a placement for project work out of good will or to get some useful work done. Usually the companies do not provide you everything required by you. You must settle this right in the beginning of the project with the business that what will you get from them and what you have to arrange yourself.

- Some times a complication arises due to the fact that some aspect of your project work is considered confidential by the company. If this is so, it is your responsibility to get whatever clearance is necessary from the organization right in the beginning as essential parts like system analysis and design, flow charts etc. can not be missing from a project report.
 - Make sure you allow enough time for writing report. It is strongly recommended that do some writing work as you carry out the project rather than leaving write up until the end. You must allow at least a month to finally write the report. There has to be enough time for the supervisor to read and comment on it and for student to make changes (sometimes extensive) on the basis of the comments. You may have to prepare two or three drafts before the final submission. Remember that it is mainly the project reports that get examined. An external supervisor receives a pile of project reports written by people who he does not know. If a project produced some software he even may not get time to see it running. In most cases he forms his judgment purely on the basis of the report. Please make your report as readable as possible content wise as well as presentation wise.
1. **Introduction:** This must contain background, any previous work done in the area of your project, your objective and other relevant material that may be helpful to further explain your project work.
 2. **The existing system:** The study of the present system; problems in existing system.
 3. **System design:** The proposed system; Any specific problem encountered at how you handled them.
 4. **Implementation of the system:** Implementation issues and their justification.
 5. **Conclusions:** Any shortcoming; your assessment of your work; comparison of your work with similar works; silent features of your work any feature modification. Real times applications of your project work.

References must be given at the end following any standard way of giving references.

For example:

Langdrof, ‘Theory of Alternating Current Machinery’ Tata McGraw Hill, July 2003.

Finally, your project work is your brainchild and nobody knows about it more than you. Be confident to explain your work at the time of viva and be honest to accept any short falls.

