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 % 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 $\int f(x)dxy$, Working rule to evaluate $\int f(x)dx$ by the substitution, Four important integrals, standard forms, Integrals of tan x, cot x, sec x, cosec x.

10 : INTEGRATION BY PARTS

$\int u.vdx$, $\int e^x[+(x)+f'(x)]dx$, 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 sinx and cosx.

14 : REDUCTION FORMULA

$\int \sin^n x$, $\int_o^{\Pi/2} \sin^n x dx$, $\int \sin^p x \cos^q x$, $\int_o^{\Pi/2} \sin^p x \cos^q x dx$, $\int \tan^n x dx$, $\int \sec^n x dx$, $\int \cos ec^n x dx$, $\int \cot^n x dx$.

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

<u>BF2 : CHEMISTRY</u>

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 Nd 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 plated 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 Partical, 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, Therorems of Pappus and Guldinus, Centroid of Volume, Centre of Gravity, Centre of Mass, Summary.

8 MOMENT OF INTERIA AND MASS MOMENT OF INTERIA

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, Compounds 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 Share Stresses.

10 SHEAR FORCE AND BENDING MOMENT DIAGRAMS 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, FD 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 Grading machines (Floor stand, Precision. Plain, cylindrical, universal centrals Internal, surface disc); Special grinding machine, (Tool and cutter grinder, cam and 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 cursing, of grinding wheel

4. BORING, BROACHING AND SAWING MACHINE

Introduction to Boring machines ; Types of Boring machine ; Boring haps 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 options compared with other process (advantages & limitations.); External; Lubrication and cooling; Application of Broaching

5. GEAR MANUFACTURING

Gear tooth e1ement; Materials for Gears; Different methods of Gear manufacturing ; Gear generating methods; Gear milling ; Gear shaping (Working principal of machine tool required Gear shaping cutters etc.) ; Gear Hibbing (Working principal of machine tool required Gear hobbing operation) ; Gear finishing process (Gear sharing burnishing, grinding honing lapping

6. METAL FINISHING PROCESS

Introduction; Honing; Description and construction of honing tool.; Application of honing process; Lopping; 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 seperable, 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, Fraunhoffer diffraction at a single slit, Condition for maxima and minima, Diffraction at a circular operature, Plane diffraction grating, Conditions for Principle maxima and minima , Resolving Power, Ray leigh'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 , Nieol 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-broglies formula by analogy with radiation. Wave length of matter waves, Electron diffraction, Davisson and Germer's experiment, Heisenberg uncertainity.

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, Substractor, 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. **ORHTOGRAPHIC SECTIONAL VIEWS:**
   Introduction, Full Screen , 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 o f 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, Domenut, 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 Recourses : 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 are to document environmental assets and polluted site – urban / rural / industrial / agriculture etc.

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

In

Electrical

Course Structure

Second Year

Third Semester

Paper Code	Subject
BSE1	Mathematics-III
BSE2	Thermodynamics
BSE3	Signals & Networks
BSE4	Digital Electronics
BSE5	Electrical Machine

.

Syllabus

BSE1 : 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) (Diversion 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 only), 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, Guass-Seidal method, Successive over-Relanation or S.O.R. method, Poisson Equation, Heat equation(parabolic equations), Wave equation (Hyperbolic Equation).

BSE2 : THERMODYNAMICS

1. Combustion of Fuel

Introduction, Mass fraction and Mole Fraction, Symbols for Elements and Compounds, Combustion Equations of Gaseous Fuels, Theoretical or Minimum Mass of Air Required for Complete Combustion, Theoretical or Minimum Volume of Air required for Complete Combustion, Excess Air Supplied, Air Fuel ratio, Analysis of products of combustion, Combustion Equations, Volumetric analysis of products, Conversion of volumetric analysis to gravimetric analysis, Volume Fraction, Conversion of volumetric Analysis into Mass Analysis or Gravimetric Analysis, Conversion of Mass Analysis into Volumetric Analysis, Mass of Carbon in Fuel Gases, The analysis of Fuel Gas, The Orsat Apparatus.

2. Entropy

Introduction, Entropy as a property, The Second Law, Analysis for Entropy, Clausius Inequality, Change of entropy in an irreversible process, Change of Entropy for Ideal Gas and Pure Substance, Change of Entropy of a perfect gas during Various Thermodynamics Processes, Change of Entropy during Constant Process (or Isobaric Process), Change of Entropy during Constant Temperature Process (or Isothermal process), Change of Entropy during Reversible Adiabatic Process (or Isentropic Process), Change of Entropy during Plytropic Process (pv^n = Constant).

3. Air Compressor

Introduction, Uses of Compressed air for industries, Types of Air Compressors, Capacity Control of Compressor, Types of compressor valves, Work done by Reciprocating Air Compressor with Clearance Volume, Effect of Clearance on volumetric efficiency, Condition for maximum efficiency in two stage compression with intercooling.

4. IC Engine

Introduction, Classification of I.C. Engines, Fuel Supply System for S.I. and C.I. Engine, Ignition Systems of Petrol Engines, Fuel Injection system for Diesel Engines, Cooling Systems for I.C. Engines, Lubrication System for I.C. Engines, Governing of internal combustion engines, Main Components of I.C. Engines, Reciprocating Internal Combustion Engines, Four-Stroke cycle, Two-stroke cycle.

5. IC Engine Testing & Performance

Indicated Power, Measurement of friction power, Indicated mean Effective Pressure, Measurement of fuel consumption, Energy balance of an I.C. Engine, Determination of mechanical, Thermal and Relative efficiency.

6. Steam Process

Introduction, Thermodynamics Processes of Vapour, Enthalpy – Entropy or H-S Chart or Mollier Diagram, Measurement of dryness-fraction of steam, Bucket or Barrel Calorimeter, BOILER, Introduction, Classification of Boilers, Boiler Mountings and Accessories, Equivalent Evaporation, Boiler Efficiency, Heat Losses in a Boiler, Heat Balance Sheet, Boiler Draught.

7. Vapour Power Cycle

Introduction, The Carnot cycle, The ideal Rankine Cycle, Factors affecting the performance of Rankine cycle.

8. Air Standard Cycle

Introduction, Otto Cycle, Diesel Cycle, Dual Combustion Cycle, Comparison of Otto, Diesel Dual Cycle, Air and Fuel-vapour mixtures Concept of air fuel Cycle.

BSE3 : 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 Interms of Two Port Parameters, Output Impedance Interms 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 Pont Immitance 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.

BSE4: 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. BOOLEN 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 Boolen 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),

BSE5 : 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

Contruction 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

Contruction and Working principle of Alternator,
Application of Alternators.

6 SYNCHRONOUS MOTORS

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

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

In

Electrical

Course Structure

Second Year

Fourth Semester

Paper Code	Subject
BSE6	Society, Environment, Engineering
BSE7	Electronic Devices & Circuit
BSE8	Analog Electronic Circuit
BSE9	Electromagnetic Theory & Appl
BSE10	Electrical Measurement – I

BSE6 : 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 contril , means of social control informal means of social control formal methods of Social control . Agencie 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.SOCIALOGY AND TECHNICAL CHANGES:

Science and society , Advantages of science and technology in the economic Development , Technology and women , Influence of Technology on social Insitutions , 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 , optimisaiton , 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 Efflent, 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 facilties, 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, Suppy & 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, Prinicples of Direction, controlling , characteristics of Good control systems, co-ordination, Tools of co-ordination, Types of co-ordination,priniciples 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, moslow's theory of motivation, Leadership, leadership Style.

BSE7 : 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, Gian Of Amplifier With Negative Feedback, Transistor Amplifier Curcuit 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

be1ween 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

BSE8 : ANALOG ELECTRONICS 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 Circuts**,**

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, Owner 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 Pallets (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

BSE9 : ELECTROMAGNETIC THEORY & APPLICATION

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 V 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

BSE10 : ELECTRICAL MEASUREMENT-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: Volmeter 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 galvcnometer 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, electrodynamometer (electrodynamic) type instruments, operating principle of electrodynamometer type instrument, construction of electrodynamometer type, instrument, torque equation of electrodynamometer 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 at 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 Wheastone Bridge, Deflection Type Wheastone 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

Electrical Engineering

Course Structure

Third Year

Fifth Semester

Paper Code	Subject
BTE1	Computer Organization
BTE2	Control System
BTE3	Power Systems
BTE4	Electrical Measurement - II
BTE5	Advanced Electrical Machines

BTE1 : COMPUTER ORGANISATION

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

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 enginering , 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, Supersymmentry 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)

BTE2 : 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, Tachnogenerators, 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

BTE3 : POWER SYSTEMS

1. LOAD CHARACTERISTICS

Introduction, advantages of electrical energy, load, connected load, demand, demand interval, maximum demand (md) or peak load, demand factor df, average load or average demand, load factor, diversity factor f_d, load diversity, utilization factor *fu*, Plant factor or capacity factor, loss factor f_{ls} ,

load curve, informations obtained from load curves , utility of load curves, Load-duration curve, procedure for plotting the load-duration curve, information available from load duration curve**,**

2. SUPPLY SYSTEM

Introduction, basic structure of an ac power system, distribution voltage level, sub transmission level, transmission level, layout of a power supply network, system interconnection, system voltages and transmission efficiency, working voltage, standardization of transmission voltages, classification of lines, comparison of conductor costs in various systems,

3. CONDUCTORS

Introduction, types of conductors, resistance, skin effect, equivalent copper section, kelvin's economy law, modified kelvin's law, graphical representation, economic current density.

4. POWER CABLES

Introduction, Cable Construction, Conductors, Insulation, Sheath, Protective Covering, Belted Cable, Screened Cable, Non-Drained Cable , Dielectric Stress, Grading Of Cables, Cable Capacitance, Charging Current Or Capacitive Current, Insulation Resistance, Dielectric Loss, Stress Distribution In A Hvdc Cable, Skin Effect, Proximity Effect**,**

5. LINE INSULATORS AND SUPPORTS

Introduction, types of insulator, v –strings, insulator materials, voltage distribution and string efficiency, improving voltage distribution, selection of insulation, line supports, wood poles, concrete poles, steel poles, supporting towers, vibration of conductors, effects of vibration on the transmission line, prevention of vibration, spacing of conductor

6. SAG AND TENSION

Introduction, sag and tension, parabolic method, catenary method, accuracy of results, loading on conductors, conductor clearance from ground, erection sag and tension, sag and tension charts, supports at unequal levels, the sag template, preparation of the sag template, method of using the template, economic span length .

7. LINE PARAMETERS

Introduction, line inductance, inductance of a conductor, external inductance, flux linkages in a group of conductors, inductance of a two-wire line, inductance of symmetrical three-phase line, Inductance of unsymmetrical three-phase line, two- wire line, symmetrical three-phase line, line capacitance, electric field of a long straight conductor, system of conductors, capacitance of two wire line, capacitance of the symmetrical three-phase line, interference between power and communication lines.

8. PER UNIT REPRESENTATION

Introduction, change of base, per unit impedance of a transformer, per unit quantities in three-phase systems, selection of base values, base quantities in terms of kv and mv a, per unit load impedance, one line diagrams, preparation of impedance diagrams

9. SHORT AND MEDIUM LINES

Introduction, classification of lines, short single-phase line, phasor diagram, short three-phase line, transmission line as a two-port network, line regulation, line efficiency or transmission efficiency, line with transformers, medium lines, nominal t model of a medium line, nominal Π model of a medium line, calculation of transmission efficiency and regulation of medium lines,

10. LONG TRANSMISSION LINES

Introduction, exact solution of a long line, physical interpretation of the long line equations, propagation constant, wavelength and velocity of propagation, characteristic impedance $z_{0,}$ hyperbolic form of line equations, evaluation of abcd parameters, ferranti effect, surge impedance loading (sil),

11. CORONA

Introduction, the phenomenon of corona, theory of corona formation, the calculation of potential gradient, factors affecting corona, disruptive critical voltage, visual critical voltage,

corona power loss, radio and television interference (ri), minimizing corona, bundled conductors

BTE4 : ELECTRICAL MEASUREMENT – II

1. **ANALOG INSTRUMENTS**
   Analog Instruments, Classification Of Analog Instruments, Principles Of Operation, Operating Forces, Constructional Details, Types Of Supports, Balancing, Torque/Weight Ratio, Control Systems, Damping Systems, Comparison Of Methods Of Damping, Methods Of Eddy Current Damping, Permanent Magnets, Pointers And Scales, Recording Instruments, Integrating Instrument

2. **GALVANOMETERS**
   Introduction, D' Arsonval Galvanometer, Torque Equation, Dynamic Behavior Of Galvanometers, Response Of Galvanometers, Operational Constants, Relative Damping, Logarithmic Decrement, Overshoot, Non-Dimensional Curves Of A Galvanometer Motion, Damping, Sensitivity, Galvanometer Shunts, Ballistic Galvanometer, Vibration Galvanometers

3. **OPTOELECTRONIC MEASUREMENT**
   Introduction, Monochromatic Light, Polarized Wave Shapes, Refraction And Refractive Index, Reflection, Absorbtion And Transmittance, Radiometry And Photometry, Terms Relating To Photometry, Laws Of Illumination, Terms Relating To Radiometry, Photometric/Radiometric Measurement Systems, Optical Sources, Optical Detectors

4. **MEASUREMENT OF POWER, ENERGY & INDUSTRIAL METERING**
   Power in d.c. Circuits, power in a.c. Circuits, electrodynamometer wattmeters, measurement of power using instrument transformers, three phase wattmeters, measurement of reactive power, general, motor meters, braking, friction, energy meters for a.c. Circuits, theory of induction type meters, polyphase energy meters, industrial metering and tariffs

5. **ELECTRONIC INSTRUMENTS**
   Introduction, electronic voltmeters and their advantages, vacuum tube voltmeters (vtvms), differential amplifier, difference amplifier type of electronic voltmeter, source follower type of electronic voltmeter, d.c. Voltmeter with direct coupled amplifier, true rms reading voltmeters, electronic multimeters, current measurements using electronic instruments, measurement of power at audio frequencies, voltmeter based instruments

6. **CATHODE RAY OSCILLOSCOPE**
   Introduction, Cathode Ray Tube (Crt), Electron Gun, Electrostatic Focusing, Electrostatic Deflection, Effect Of Beam Transit Time And Frequency Limitations, Deflection Plates, Screen For Crts, Graticule, Aquadag, Colour Crt Displays, Time Base Generators, Oscilloscope Amplifiers, Vertical Input And Sweep Generator Signal Synchronization, Attenuators, Basic Cro Circuit, Accessories Of Cathode Ray Oscilloscopes

7. **HIGH VOLTAGE AND MAGNETIC MEASUREMENTS, TESTING**
   Types Of Tests, Testing Apparatus, Equipment For Voltage Measurement, Localization Of Faults In High Voltage Cables, Testing Of Insulating Materials, High Voltage Testing Of Cables, Magnetic Measurements, Ballistic Tests, Permeameters, Alternating Current Magnetic Testing, Method Of Measurement Of Iron Losses

8. **HIGH FREQUENCY MEASUREMENTS**
   Introduction, resonance methods, measurement of inductance, measurement of capacitance, measurement of effective resistance, resistance variation method, reactance variation method, t networks, parallel t network, bridge t network, q meter.

BTE5 : ADVANCED ELECTRICAL MACHINES

1 TRANSFORMER

Three winding transformer; Unbalanced operation of three phase transformer; Switching-in transients and mechanical forces.

2 ELECTROMECHANICAL ENERGY CONVERSION

Field energy- energy and co-energy; Torque/force in a singly excited and multiple excited electromechanical systems and applications.

3 D.C MACHINES

Flux and mmf waves; Commutation; Ward Leonard method; Braking; Parallel operation of generators; Dynamic equations, block diagrams and transfer functions.

4 SPECIAL D.C.MACHINES

Stepper Motors, Brushless Dc Motors, Variable-Reluctance Motors

5 POLYPHASE SYNCHRONOUS MACHINES

Basic Synchronous-machine Parameters, General Machine Equations, Three-phase Synchronous Machine (with no Amortisseurs), Balanced Steady-State Analysis , Synchronizing

6 POLYPHASE INDUCTION MACHINES

Transformations, Electrical Performance equations, High-torque Cage Motors, Induction Machine Dynamics.

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

In

ELECTRICAL

Course Structure

Third Year

Sixth Semester

Paper Code	Subject
BTE6	Power Electronics & Devices
BTE7	Digital Signal Processing
BTE8	Micro - Processor
BTE9	Advance Power System & Design
BTE10	Industrial Economics & Management

BTE 6 : 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, Tharistors 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 Convertors, 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

BTE7 : 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

BTE8 : 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 bobs-based microcomputer, memory interfacing, the sdk-85 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 programe, main program, program description, internet 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 (aid) 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/displa y 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: Hardw Are-Retriggerable 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 Pea Tures 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.

BTE9 : ADVANCE POWER SYSTEM & DESIGN

Chapter 1 : Introduction : A Perspective, Structure of power systems, Conventional Sources of Electric Energy, Renewable Energy Sources, Energy Storage, Growth of Power Systems in India.

Chapter 2 : Representation of power System : Introduction, Single-phase Solution of Balan Three-phase Networks, One Line Diagram and Impeded Reactance Diagram, Per unit (PU) System, Complex Power, Synchronous Machine.

Chapter 3 : Representation of Loads, Load Flow Studies : Introduction, Y'bus by singular Transformation, Load flow problem, Gauss-seidel Method, Optical system Operation, Automatic Generality voltage Control, Symmetrical F2 Analysis.

Chapter 4 : Symmetrical Components : Introduction, Symmetrical Component Transformation, Phase Shift in star-Delta Transformers, Sequence Impedances of transmission Lines, Sequence Impedances and Sequence Network of power System, Sequence Impedances and Networks of Synchronous Machine, Sequence Impedances of Transmission Lines, Sequence Impedances of Transmission Lines, Sequence Impedances and Networks of Transformers, Construction of sequence Networks of a power System.

Chapter 5 : Unsymmetrical Fault Analysis : Introduction, Symmetrical Component analysis of Unsymmetrical Faults, Single Line-To-Ground (LG) Fault, Line-To-Line (LL) Fault, Double Line-To-Ground (LLG) Fault, Open Conductor Faults, Bus Impedance Matrix Method For Analysis of Unsymmetrical Shunt Faults.

Chapter 6 : Power System Stability : Introduction, Dynamics of a Synchronous Machine, Power Angle Equation, Node Elimination Technique, Simple Systems, Numerical Solution of swing Equation, Multimachine Stability, some Factors Affecting Transient Stability.

Chapter 7 : Power System Security : Introduction, System State Classification, Security Analysis, Contingency Analysis, Sensitivity Factors, Power System Voltage Stability.

BTE 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 .

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

In

ELECTRICAL

Course Structure

Fourth Year

VII Semester

Syllabus

Paper Code	Name of the Subject
BEE1	Switchgear & Protection
BEE2	Utilization Of Electrical Power
BEE3	Communication Engineering
BEE4	Electronics Instrumentation
BEE5	Elective-I
BEE1P	Switchgear & Protection Practical
BEE4P	Electronics Instrumentation Practical

BEE 1 : SWITCHGEAR & PROTECTION

1. INTRODUCTION

Essential Qualities of Protection, Classification of Protective relays, Current Transformers for Protection, Potential transformer, summation transformer.

2. OPERATING PRINCIPLES AND RELAY CONSTRUCTION

Electromagnetic Relays, Thermal Relays, Static Relays, Microprocessor- based Protective Relays.

3. OVERCURRENT PROTECTION

Time – Current characteristics, current setting, time setting, overcurrent protective schemes, reverse power or directional relay, protection of parallel feeders, protection of ring mains, earth fault and phase fault protection, combined earth fault and phase fault protective scheme, phase fault protective scheme, directional earth fault relay, static overcurrent relays, microprocessor-based overcurrent relays.

4. DISTANCE PROTECTION

Impedance Relay, Reactance Relay, MHO (Admittance or Angle Admittance) Relay, Angle Impedance (OHM) Relay, Input Quantities for Various Types of Distance Relays, Sampling Comparator, effect of ARC resistance on the performance of Distance Relays, Effect of power surges(power swings) on the performance of distance relays, effect of line length and source impedance on distance relays, selection of distance relays, MHO relay with Blinders, Quadrilateral relay, Elliptical Relay, Restricted MHO Relay, Restricted Impedance Relay, Restricted Impedance relay, restricted Directional Relay, Restricted Reactance Relay, some other Distance Relay characteristics, swiveling characteristics, choice of characteristics for Different Zones of Protection, Compensation for correct Distance Measurement, Reduction of Measuring Units, Switched Schemes, Auto reclosing.

5. PILOT RELAYING SCHEMES

Wire pilot protection, carrier current protection

6. AC MACHINES AND BUS – ZONE PROTECTION

Protection of Generators, Transformer Protection, Bus-Zone protection, Frame Leakage Protection.

7. MICROPROCESSOR BASED PROTECTIVE RELAYS

Introduction, Overcurrent Relays, Impedance Relay, Directional Relay, Reactance Relay, Generalized Mathematical Expression for Distance Relays, Measurement of R and X, MHO and Offset MHO Relays.

BEE 2 : UTILIZATION OF ELECTRICAL POWER

1. NON – CONVENTIONAL AND CONVENTIONAL SOURCES OF ENERGY

Introduction, Tidal power, wind power, Geothermal power, wave power, magneto hydro dynamic (MHD)Generation, solar Energy, Hydro station, Steam power plant, Nuclear power plants, the gas turbine plant.

2. ECONOMICS OF GENERATION

Introduction, Definitions, Load Duration curve, Number and size of generator units, Cost of electrical energy, Tariff or charge to consumer.

3. DISTRIBUTION

Introduction, Types of Distribution system, Kelvin's law, Distributor, Substation, Cost comparison of distribution systems.

4. ELECTRIC DRIVES AND INDUSTRIAL APPLICATIONS

Introduction, Factors affecting selection of motor, Types of loads, Steady state characteristics of drives, transient characteristics, size of motor, load equalization, Industrial applications, Modern approach to speed Control of D.C. Drives.

5.ELECTRIC HEATING AND WELDING

Introduction, Classification of methods of electric heating, Requirements of a good heating material, Design of heating element, Temperature control of resistance furnace, Electric arc furnace, Induction heating, Dielectric heating, Resistance welding, Electric arc welding.

6. ELECTRIC TRACTION

Introduction, requirements of an ideal traction system, supply system for electric traction, train movement, mechanism of train movement, the traction motors, Traction motor control, control of single phase series motors, speed control of 3-phase induction motors, multiple unit control, Braking of electric motors, electrolysis by currents through earth, current collection systems, Thyristors used in traction system.

BEE 3 : COMMUNICATION ENGINEERING

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

. AMPLITUDE MODULATION
Introduction, definition of am, generation of am wave, double-sideband supressed-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 errqr analysis, repeaters, digital-modulation systems, amplitude-shift keying (ask), freq.uency.shift keying (fsk), four-phase or quarternary 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

BEE 4 : ELECTRONICS INSTRUMENTATION

1. ELECTRONIC INSTRUMENTS FOR MEASURING BASIC PARAMETERS
Introduction, Amplified DC Meter, AC Voltmeter using Rectifiers, AC voltmeters Using Rectifiers, True RMS-Responding voltmeter, Electronic Multimeter, Considerations in choosing an Analog voltmeter, Digital Voltmeters, Components Measuring Instruments , Vector Impedance Meter, Vector Voltmeter, RF Power and voltage Measurement

2. OSCILLOSCOPES
Introduction , Oscilloscope Block Diagram, Cathode Ray Tube , CRT Circuits , Vertical Deflection System, Delay Line, Multiple Trace Horizontal Deflection System , Oscilloscope Probes and Transducers , Oscilloscope Techniques, Special Oscilloscopes

3. SIGNAL GENERATION
Introduction, The sine –wave generator, Frequency Divider generator, Signal generator modulation, Sweep-Frequency Generator , Pulse and square –wave generators, Function Generator, Audiofrequency Signal Generation.
4. SIGNAL ANALYSIS
Introduction, Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analysis .

5. FREQUENCY COUNTERS AND TIME-INTERVAL MEASUREMENTS
Simple Frequency Counter, Measurement Errors, Extending the frequency range of the counter, Automatic and computing counters,

6. TRANSDUCERS AS INPUT ELEMENTS TO INSTRUMENTATION SYSTEMS
Classification of Transducers , Selecting a Transducer, Strain Gages, Displacement Transducers, Temperature Measurements, Photosensitive Devices.

7. ANALOG AND DIGITAL DATA ACQUISTION SYSTEMS
Instrumentations Systems, Interfacing Transducers to Electronic Control & Measuring Systems, Multiplexing .

8. COMPUTER –CONTROLLED TEST SYSTEMS

Introduction, Testing an Audio Amplifier, Testing a Radio Receiver, Instruments Used in computer-controlled instrumentation, IEEE 488 Electrical Interface, Digital Control Description, Example of Signal Timing in a Microprocessor-Based

9. FIBER OPTICS MEASUREMENTS

Introduction, Sources and Detectors, Fiber Optic Power Measuring, Stabilized , calibrated Light Sources, End-to-End Measurement of Fiber System Loss, Optical Time – Domain Reflectometer.

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

In

ELECTRICAL

Course Structure

Fourth Year

VII Semester

Elective – I

Paper Code	Name of the Subject
BEE5-I	EHV Transmission
BEE5-II	Power System Reliability
BEE5-III	Illumination Engineering
BEE5-IV	High Voltage Engineering

Syllabus

BEE5-1 : EXTRA HIGH VOLTAGE (EHV) TRANSMISSION

1. **HVDC POWER FLOW**
   Subscripts and symbols, Thyristor principle and control, Power conversion principle, Direct Voltage Ud1 and Ud2, Power at Rectifier-end Pd1, Power at Inverter-end Pd2, Power loss in DC system, Power in middle of HVDC line, Power at sending end, Power at receiving end, General equations, Solved Numerical examples on Pd and Ud, Summary and Questions.

2. **CONVERTER CONNECTIONS, RECTIFIER AND INVERTER WAVEFORMS**
   Rectifier Bridge Connections and Waveforms on AC and DC side, Six Pulse Bridge (Graetz Bridge), 12-Pulse Bridge, Phase Control and Delay angle, Effect of Phase control on DC Voltage, Valve Voltage, Inversion, Connections of Converter Bridge, Commutating Reactance, Angle of Overlap Extinction Angle, Significance of Delay Angle and Extinction Angle, Control of DC Voltage, Configuration of Bipolar 2T HVDC System, Valves and Converters, Summary and Questions.

3. **REACTIVE POWER COMPENSATION IN HVDC SUBSTATIONS**
   Reactive Power requirements of HVDC Converters, P.Q.S., Reactive Power Q required by converter, and HVDC Substation, Reactive power equations, Effect of delay angle and Extinction angle, Short Circuit Ratio (SCR), Impedance of AC Network, Equivalent short circuit ratio, SCR in Planning of HVDC. Transient Voltage Rise, Summary and Questions.

4. **MULTI-TERMINAL HVDC SYSTEMS**
   Two pole HVDC with earth return, substation poles in different locations, MTDC System with series connected convertors, MTDC System with parallel connected converters, Control of Parallel connected HVDBC System, Reversal of power in a terminal of HVDC System, Three TDC System with parallel tapping , Two pole reversal in 3 TDC System, HVDC Breakers in MTDC System, Applications of MTDC Systems, Worlds First Commercial 3 TDC System, World's first 5 TDC System, Configuration and Type of HVDC System, Summary and Questions.

5. **INSULATION REQUIREMENT OF EHV – AC AND HVDC EQUIPMENT AND TRANSMISSION LINES**
   Classification : Self restoring and Non-self restoring insulation, Insulation Design Aspects, Stresses on Insulation , Tests, Causes of Flashover through Air and Gases, Insulation withstand characteristics of Air Gaps, Leakage Distance or Creepage Distance of AC Insulators, Leakage Distance or Creepage Distance of DC Insulators Line Insulator Design with respect to Creepage Distance, Voltage Grading Rings (Collector Rings) to reduce pollution, Grease or Petroleum Jelly to reduce flashovers, Electrolytic Action affecting pin type DC Insulators. Effect of Wetting and contamination on leakage currents, Clearances (Insulation Distance) for AC and HVDC, Clearances in HVDC Substations, Choice of Clearance based on impulse withstand level, summary and questions.

6. **ENGINEERING ASPECTS OF EHV – AC TRANSMISSION AND TRANSMISSION PLANNING**
   Electrical, Mechanical and Thermal Design Aspects, Engineering Aspects of EHV AC Transmission system, Transmission Planning and its co-relation with Generation Planning, Distribution Planning, Why 400 kV AC was selected in India, Recent advances, Summary and Questions.

7. **ELECTROSTATIC FIELD AT GROUND LEVEL AND BIOLOGICAL EFFECTS (EHV –AC AND HVDC)**
   Basic principles and terms in Electromagnetic Field theory, Significance of Electric Field Intensity (Negative of Potential Gradient) at ground level, Electric field intensity of 3 phase AC line at ground level beneath the conductors and at the edge of Row, Charging of Objects, Vehicles and Human Body, Biological effects on Human Beings, Shock Effects of Electric Field, Contact Currents, Limiting Values of 50 Hz Contact Currents, Summary and Questions.

8. **CORONA AND CORONA LOSSES (EHV – AC AND HVDC)**
   Principle of Corona, Emperical Formulae for Ec and Ecr, Terms and Definitions, Corona of AC Overhead Lines, Factors affecting Corona, Conclusion of Research on Bad Weather Corona, Corona Losses in AC Transmission, Variation in Corona Loss during one year, factors affecting Corona Losses, Notations of terms in Derivations, Critical Surface Gradient, Peek's Law, Critical Disruptive Voltage and
   Critical Electric Stress for Visual Corona, Corona Phenomenon with HVDC, Critical HVDC Voltage and Corona, Bipolar Corona Loss, Influence of Weather on DC Corona Loss, Summary and Questions.
9. **RADIO INTERFERENCE, TV INTERFERENCE AND AUDIBLE NOISE (EHV – AC & HVDC)**
   RADIO INTERFERENCE
   Units of Measurement of RI, Generation of RI, propagation and Attenuation of RI, Attenuation of RI waves, Radio Interference Field Strength against Distance, RI Design Criterion for EHV AC Line, Signal to Noise Ratio (SNR), Broadcast Signal Strength, RI Lateral Attenuation with Distance, RI at Edge of Row, Minimising RI and TVI, Bundled Conductor for reducing Corona and RI, Evaluation of RI by Comparison Method & Semi Analytical Method.
   TV Interference : Comparison Formula for TVI Calculation of AC Lines RI and TVI Calculation of AC Lines RI and TVI in HVDC Overhead Lines, Elimination of DC Harmonics, RI from Bipolar HVDC Line, Comparision of RI from HVDC line and EHV AC line TVI from HVDC Line.
   Audible Noise : Terms and Defintions of Acoustics, Fundamentals of Sound, Measurement of AN and weighting curves, Attenuation of Sound Pressure Level, Acceptable Level of Audible Noise, Causes of AN in substation and Transmission Line, Audible Noisein Transformers and reactors, Audible Noise in Transmission Lines, Limits of AN, Transmission Line Design based on AN, Steps in Evaluating RN, Day and night equivalent of AN, Calculation and Estimated AN of Transmission line, Sound Level of Transmission line, AN of HVDC line, Summary and Questions.

BEE5-II : POWER SYSTEM RELIABILITY

1. THE STABILITY PROBLEM
Definations and illustyrations of terms, Multimachine systems, A mechanical analogue of system stability, Bad effects of instability, Scope of this book, Historical review.

2. THE SWING EQUATION AND ITS SOLUTION

Review of the laws of mechanics; translation, Rotation, The swing equation, The inertia constant, Point-by-point solution of the swing equation, Assumptions commonly made in stability studies.

3. SOLUTION OF NETWORKS

The impedance diagram (positive-sequence*network), per-unit quantities, Representation of large synchronous machines, Transmission lines and cables, Representation of loads, representation of faults, Miscellaneous equipment, Representation of remote of the system, Check list of data required for transient-stability study, The alternating-current calculating board, Description of General Electric A-C, Network Analyzer, Procedure for using calculating board, Algebraic solution of networks: determination of terminal admittances, Algebraic solution of networks: network reduction, Repeat steps 3 and 4 until all nodes except the terminals have been eliminated***, Determination of initial operating conditions, Network reduction by use of calculating board, Combining machines, Treatment of synchronous condensers.

4. THE EQUAL-AREA CRITERION FOR STABILITY

Applicability of the equal-area criterion, One machine swinging with respect to an infinite bus, The power-angle equation, Applications of the criterion, Two finite machines, Reactance network, Determination of swing curve by graphical integration.

5. FURTHER CONSIDERATION OF THE TWO-MACHINE SYSTEM

Pre-calculated swing curves, Effect of fault-clearing time on transient stability limit, Summary of methods of calculating transient stability, Certain factors affecting stability.

6. SOLUTION OF FAULTED THREE-PHASE NETWORKS

Symmetrical components, Sequence impedances, The sequence networks, Representation of short circuits by connections between the sequence networks, Fault shunts, Effect of type of fault on stability, Effect of fault impedance, Unsymmetrical open circuits and series impedances, Simultaneous faults and other double unbalances, The zero-sequence network, Representation of lines in the zero-sequence network, Representation of transformers in the sequence networks, Effect of grounding on stability, Two-phase coordinates.

7. TYPICAL STABILITY STUDIES

Description of systems, Fault locations, Swing curves, Stability during load condition I : faults on 132-kv. System of company A, Study of proposed changes at station BB, Faults on the 44-kv, system of company A, Faults on the 44-kv. Line between stations BE and BG, Faults on 44-kv, line between stations BG and BH, Stability during load condition 2, Proposed interconnecting lines, Scope of the study, Loads, Method of determining power limits, Simplification of systems, Swing curves, part 1, Power-angle curves, part 2, Staged-fault tests.

BEE5-III : ILLUMINATION ENGINEERING

1. LIGHT, SIGHT & COLOUR

Electromagnetic radiation, Laws of radiation, Light flux, Light intensity, illuminance laws, Luminance, Surface reflectance, Structure of the eye, photopic, mesopic and scotopic vision, trichromatism, perception details, visual performance, adaptation, flicker, glare, perception of objects and spaces, photocell, lighting measurement, physics of colour, colour mixing, colour appearance, colour temperature, surface colours, colour rendering & rendition index.

2. LAMPS AND ACCESSORIES

Light production by gas discharge, fluorescence, incandescence, daylight principle of operation, light efficacy, colour, electrical characteristics, typical applications, dimming condition of GLS filament, tungsten halogen lamps, fluorescent tubes, compact fluorescent lamp (cfl), low and high pressure sodium lamps, high pressure mercury lamp, metal halide lamp.

3. LUMINARIES

Functions of luminaries, classification, Materials Used in luminaries manufacturing, reflection, refraction, diffusion, polarization and optical design, photometric measurements, application data and its use.

4. INTERIOR LIGHTING

Objectives quantity and quality of light, selection of lamps, luminaries section, placement. Design considerations for lighting of offices, conference rooms, hospitals, teaching places, house, hotels, art galleries, museums, shops, shopping centres, temples factories etc., design calculations.

5. EXTERIOR LIGHTING DESIGN

Exterior lighting objectives, choice of lamps type, luminaries, lighting of parks and gardens, pathways, outdoor work areas. Lamps and luminaries photometric data and its use in design calculation, glare consideration.

6. ROAD LIGHTING

Aims of road lighting, quantitative and qualitative lighting needs, luminance concept, road reflection characteristics, light sources, luminaries, road lighting design calculations, sliting of luminaries on straight roads, junctions, and special situations, esthetics, maintenance, lighting for residential colony road lighting, tunnel lighting design requirements and criteria. High mast lighting for roads.

7. UTILITY AREA LIGHTING

Objectives of utility area lighting, lighting for marshalling yards, outdoor working and storage areas, container terminals, airport aprons, docks and harbors etc., ask analysis and considerations for lighting parameters and design.

8. SPORTS LIGHTING

Indoor and outdoor games, lighting parameter requirements for players, TV cameras, horizontal and vertical luminance, glare limitation, level of competition, light sources, location of luminaries.

9. DECORATIVE FLOOD LIGHTING

Introduction to the principle of decorative building flood lighting, consideration for the shape and form, selection of lamps and luminaries, design criteria.

10. EMERGENCY LIGHTING

Regulations standards and its requirements, escape lighting, standby system.

11. LIGHTING CONTROLS

Types of lighting controls, strategy for selection, benefits of lighting control.

12. DISTRIBUTION OF SYSTEM AND MAINTENANCE

Electric distribution system for lighting, maintenance strategies, group replacement schedule.

13. ENERGY EFFICIENT LIGHTING DESIGN AND COMPUTER AIDED LIGHTING DESIGN

Techniques of achieving energy efficient lighting design, role of computers in lighting design, advantages and limitations of computer aided lighting design.

BEE5-IV : HIGH VOLTAGE ENGINEERING

1. ELECTROSTATIC FIELDS THEIR CONTROL AND ESTIMATION

Electric field stress, its control and estimation, analysis of Electrical field intensity in Homogenous Isotropic Single dielectric and multi dielectric systems. Introduction to Numerical methods for the estimation of electric field intensity.

2. CONDUCTION AND BREAKDOWN IN AIR AND OTHER GASEOUS DIELECTRICS IN ELECTRIC FIELDS.

Ionization processes, Townsend's current growth equation-primary and secondary processes, townsend's criterion for breakdown in electronegative gasses, Paschen's law, breakdown in non-uniform fields and corona discharges, post-breakdown phenomena and application, practical considerations in using gas for insulation purposes.

3. CONDUCTION AND BREAKDOWN IN LIQUID DIELECTRICS

Conduction and breakdown in pure liquids, conduction and breakdown in commercial liquids.

4. BREAKDOWN IN SOLID DIELECTRICS

Intrinsic, Electro – Mechanical and Thermal breakdown, Breakdown of solid dielectrics in practice, Breakdown of composite insulation, solid dielectrics used in practice, application of insulating materials in electrical power apparatus, electronic equipments.

5. GENERATION OF HIGH VOLTAGE AND CURRENTS

Generation of HV DC, HV AC and Impulse Voltage, Generation of impulse currents, Tripping and control of impulse generators.

6. MEASUREMENT OF HIGH VOLTAGE AND CURRENTS

Measurement of HV DC, HV AC and impulse voltage and currents.

7. TESTING AND EVALUATION OF DIELECTRIC MATERIALS AND POWER APPARATUS.

Non – Destructive Testing of dielectric materials, DC resistivity measurement, Dielectric and loss factor measurement, partial discharge measurement, testing of insulators, bushing, isolators, circuit breakers, cable, transformers, high voltage motors, surge diverters, radio interference measurement.

8. HIGH VOLTAGE LABORATORY – DESIGN, PLANNING AND LAYOUT

Size and dimensions of the equipment and their layout, earthing and its importance.

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

In

ELECTRICAL

Course Structure

Fourth Year

VIII Semester

Paper Code	Name of the Subject
BEE6	Machine Drives
BEE7	Design & Estimation Of Electrical System
BEE8	Electrical Machine design
BEE9	Project
BEE6P	Machine drives

Syllabus

BEE 6 MACHINE DRIVES

1. **CHARACTERISTICS OF THE ELECTRIC MOTORS**
   Introduction, Characteristics Of Dc Motors, Characteristic Of Three-Phase Induction Motor , Variation Of Applied Voltage, Pole Change Motors, Slip Power Recovery Schemes, Characteristics Of Synchronous Motors
2. **DYNAMICS OF ELECTRIC DRIVES**
   Introduction, Classification Of Electric Drives, Basic Elements Of An Electric Drive, Dynamic Conditions Of A Drive System, Stabili1y Considerations Of Electrical Drives
3. **CONVERTERS FOR FEEDING ELECTRIC MOTORS**
   A General Survey Of Converters For Feeding Electric Motors, Phase Controlled Line Commutated Converters
4. **CONTROL OF ELECTRIC MOTOR**
   Induction motor drives, synchronous motor drives, dc drives.
5. **CONTROL TECHNIQUES**
   Introduction, block diagram representation of drive systems, signal flow graph representation of the systems, transfer functions, transient response of closed loop drive systems, frequency response approach

BEE 7 DESIGN AND ESTIMATION OF ELECTRICAL SYSTEMS

1. ELEMENTS OF ESTIMATING:

.Introduction ,Purpose of Estimating and Costing:, Qualities of a good Estimator, Essential Elements of Estimating and Costing, Tender, Guidelines for Inviting Tenders, Quotation, Other Important Factors of Estimating and Costing, Brief Questions with Answers.

2. CONVENTIONAL SYMBOLS:

Differential Types of Symbols.

3. WIRES, WIRE JOINTS, TERMINATION AND WIRING TOOLS:

Introduction, Wire and Cable, Choice of Conductor, Conductor Materials, Insulating Materials ,Types of Wires used for Internal Wiring, Wire Splicing and Termination.

4. TYPES OF HOUSE WIRING:

Cleat Wiring, Wooden Casing and Capping Wiring, PVC Casing and Capping Wiring, Tough Rubber Sheathed Wiring or Batton Wiring, Lead Sheathed or Metal Sheathed Wiring, Conduit Wiring System, Conduit Accessories and Fitting, Advantages and Disadvantages of Conduit Wiring Systems.

5. WIRING MATERIALS:

Domestic Wiring Accessories , Miniature Circuit Breaker, Residual Current Circuit Breaker or Earth Leakage Circuit Breaker, Components used for Protection Against Earth Leakage Current, Characteristics, Working and Construction of ELCB or RCCB; Load Change, Over Switches

6. TESTING OF INSTALLATION:

General , Insulation Resistance Test between Installation and Earth, Testing of Insulation Resistance Test between Conductors, Testing of Polarity of Single Pole Switches, Earth Continuity, How to Measure Earth Resistance , Merger Earth Tester, Voltmeter Method of Testing Earth.

7. PROTECTION AGAINST OVERLOAD, SHORT CIRCUIT AND EARTH FAULTS.

General , Main Features of Good Protective Devices, Protective Relays, Essential Fundamental Elements of Relay, Description of Relays, Buchholz Relay Protection, Electromagnetic Attraction Type Relays, Induction Type Over Current Relay, Induction Type Reverse Power Relay, Moulded Case Circuit Breakers.

8. EARTHING, ELECTRIC SHOCK , ELECTRIC FIRE, FIRE FIGHTING EQUIPEMENT:

Earthing, Purpose of Earthing, IS Specification Regarding Earthing of Electrical Installation, Definitions, Different Methods of Earthing , Brief Question- Answers, Electric Shock Factors on which Intensity of Electric Shock Depends, Cure of Electric Shock, Brief Questions Answers, Electrical Fire-fighting, Fire fighting Teams.

9. DOMESTIC ELECTRICAL INSTALLATION AND ESTIMATES:

General , Definitions, Drawing , Definition and Measurements of Points and Wiring, Electric Sub- station and Wiring Installation, Electric Installation in Building , Control at Commencement of Supply, Types of SB's Capacity of Circuit Internal Wiring Estimates, Sequence to be followed in Carrying out the Estimates, Definition and Positioning of Equipment , Arrangement of Apparatus, Locations of Various Outlets in House Wiring, Selection of Wires. Sub-circuits , Selection Rating and Installation of Necessity Equipment on the Main Switch Board.

10. MOTOR (CONTACTOR)CONTROL CIRCUITS:

General, Definitions of Equipments, Contactor Control Circuit Components, Contactor Control Circuits and Diagrams, Design Guidelines , Motor Control Circuits, Sequence Starting of Motors Manually/ Automatically, Automatic Sequence Control of Two and Three Motors with Time Delay, Motor Operated from Two Alternative Sources of Supplies , Starting of Two speed Squirrel Cage Induction Motor, Star Delta Starters.

11. THREE PHASE FOUR WIRE DISTRIBUTION SYSTEM:

General, Transmission Systems from Sub- station, Comparison between D.C. and A.C . Supply System, Components of Distribution Overhead Line, Determination of Size of Conductor for Overhead Transmission Line. Insulators ,Various Types of Insulators, Methods of Tieing, Conductor with Insulator, Lightning Arrester, Earthing of Transmission , Stay Tightners,

12. UNDERGROUND CABLES, INSTALLATION, ESTIMATES AND STREET LIGHTING:

General , Planning the Route for Cable Laying, Laying of Cable, Precautions of Excavation of Trenches, Procedures for Drawing in Cables, Classification of Cables, Underground Cables for Street Lighting , Laying of Cables, Street Light Poles.

BEE8 –Electrical Machine Design

Basic principles of magnetic circuit, Magnetic circuit calculation ,Iron loss,magnetic leakage calculations, magnetic current, unbalanced magnetic pull, field form, armature winding, Integrated approach for windings, production of emf in windings, mmf distribution of armature winding, eddy current losses in conductors, transformers, design, operating characteristics, design of small single phase transformers, general concept and constraints of design of rotating machines, d.c machine design, armature reaction armature design, design of field system, commutation, design of interpoles, design of interpoles and brushes, losses and effiency, three phase induction motor ,design,rotor design, design of squirrel cage rotor, operating characteristics ,single phase induction motor, design, operating characteristics

BEE9: 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.

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.

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 form the work of others (published or un published) 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.