

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

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

First Semester

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

SYLLABUS

BF1 : MATHEMATICS I

1 : LIMITS AND CONTINUITY OF A FUNCTION.

2 : DIFFERENTIATION.

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

3 : SUCCESSIVE DIFFERENTIATION

Calculation of nth derivative, Leibnitz's theorem.

4 : GENERAL THEOREMS, EXPANSION OF FUNCTIONS.

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

Expansion of functions;

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

5 : INDETERMINATE FORM

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

1^∞ , ∞^0 form.

6 : CURVATURE

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

7 : MAXIMA AND MINIMA

Maximum and Minimum values of a function.

8 : ELEMENTARY INTEGRATION

Table of elementary integrals, Simple examples.

9 : INTEGRATION BY SUBSTITUTION

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

10 : INTEGRATION BY PARTS

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

11 : INTEGRATION BY PARTIAL FRACTIONS

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

12 : INTEGRATION OF IRRATIONAL ALGEBRAIC FUNCTIONS

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

13 : INTEGRATION OF TRIGNOMETRIC FUNCTIONS

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

14 : REDUCTION FORMULA

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

15 : DEFINITE INTEGRALS

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

16 : AREAS OF PLANE CURVES

17 : VOLUMES AND SURFACES OF SOLIDS OF REVOLUTION

18 : LENGTHS OF PLANE CURVES

Arc Formulae, Arc formulae for polar equations.

19 : SIMPSON'S RULE

BF2 : CHEMISTRY

1. WATER TREATMENT:

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

2. FUELS

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

3. LUBRICANTS

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

4. POLYMERS AND PLASTICS

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

Questions.

5. THERMODYNAMICS

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

6. CORROSION

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

7. ENVIRONMENTAL POLLUTION CHEMISTRY

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

8. METALLIC BOND AND SEMICONDUCTORS

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

BF3 : ENGLISH FOR COMMUNICATION

1. THE COMMUNICATION EVENTS

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

2. SUMMARIZATION

Summary Writing

3. COMPREHENSION AND VOCABULARY

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

4. PRINCIPLE OF LANGUAGE GRAMMAR AND USAGES

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

5. BASIC OFFICIAL CORRESPONDENCE

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

6. TECHNICAL WRITING

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

BF4 : ELECTRICAL TECHNOLOGY

1. BASIC CONCEPTS & UNITS:

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

2. ELECTROSTATICS:

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

3. ELECTRIC CIRCUIT ELEMENTS:

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

4. ELECTROLYSIS & STORAGE CELL:

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

5. ELECTROMAGNETISM:

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

6. SINGLE PHASE AC CIRCUITS:

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

BF5 : MECHANICS

1 INTRODUCTION

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

2 STATICS OF PARTICLES CONCURRENT FORCES IN PLANE

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

3 STATICS OF PARTICLES CONCURRENT FORCES IN SPACE

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

4 STATICS OF RIGID BODIES___ NON – CONCURRENT FORCES IN PLANE

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

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

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

6 FRICTION

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

7 CENTROID AND CENTRE OF GRAVITY

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

8 MOMENT OF INERTIA AND MASS MOMENT OF INERTIA

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

9 SIMPLE STRESSES AND STRAINS SSS-1

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

10 SHEAR FORCE AND BENDING MOMENT 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, SF and BMD for Beams Subjected to Various Loads, Short Cut Procedure.

BF6 : INTRODUCTION TO MANUFACTURING PROCESSES

UNIT I :

1. MILLING MACHINES

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

2. THE LATHE

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

3. GRINDING MACHINE

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

4. BORING, BROACHING AND SAWING MACHINE

Introduction to Boring machines ; Types of Boring machine ; Boring 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 element; 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 Hobbining (Working principal of machine tool required Gear hobbing operation) ; Gear finishing process (Gear shaping burnishing, grinding honing lapping

6. METAL FINISHING PROCESS

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

7. PATTERN MAKING

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

8. MOULDING AND CORE MAKING

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

9. CASTING PROCESSES

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

10. WELDING

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

11. RECENT DEVELOPMENT IN MANUFACTURING PROCESS

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

UNIT 2 : (ONLY FOR BF6 STUDENTS)

12. FOUNDRY TOOLS AND EQUIPMENTS

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

13. HOT AND COLD WORKING PROCESS

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

14. POWDER METALLURGY

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

15. PLASTIC MANUFACTURING PROCESS

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

UNIT 3 : (ONLY FOR BSM5 STUDENTS)

1. Metal Cutting and Cutting Tools

2. Drilling Machines

3. Shaper, Planner and Slotting Machine

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

Course Structure

First Year

Second Semester

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

SYLLABUS

BF7 : MATHEMATICS - II

1. MATRICES

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

2. FINITE DIFFERENCE & DIFFERENCE EQUATION & NUMERICAL METHODS:

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

3. DIFFERENTIAL EQUATIONS:

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

Application of Differential Integrals: Physical applications of linear equations.

4. FUNCTIONS OF COMPLEX VARIABLE:

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

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

BF8 : APPLIED PHYSICS

UNIT – I

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

UNIT-II

A. Diffraction:

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

B. Ultrasonics:

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

C. Polarisation:

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

D. NUCLEAR PHYSICS

UNIT-III.

A.Wave Particle Quality:

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

B. Wave Equation:

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

UNIT-IV

A. Laser

B.Magnetism

UNIT-V

A. Semiconductor Physics:

B. Modern Physics:

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

BF9 : PROGRAMMING AND DATASTRUCTURE

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

BF10 : BASIC ELECTRONICS

1. ELECTRONIC COMPONENTS

(1) Passive Components :-

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

(2) Active Components :-

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

2. SEMICONDUCTOR THEORY AND P-N JUNCTION

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

3. SPECIAL PURPOSE DIODE

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

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

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

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

5. FIELD EFFECT TRANSISTOR (FET):-

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

6. INTEGRATED CIRCUITS (IC'S):-

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

BF11 : ENGINEERING DRAWING AND GRAPHICS

1. FUNDAMENTAL OF ENGINEERING DRAWING:

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

2. ENGINEERING CURVES:

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

3. ORTHOGRAPHIC PROJECTIONS:

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

4. ORTHOGRAPHIC SECTIONAL VIEWS:

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

5. ISOMETRIC PROJECTIONS:

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

6. PROJECTIONS OF STRAIGHT LINES:

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

7. PROJECTION OF PLANES:

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

8. PROJECTION OF SOLIDS:

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

9. SECTIONS OF SOLIDS:

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

10. DEVELOPMENT OF SURFACES:

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

11. FREE –HAND SKETCHES:

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

BF 12 : ENVIRONMENTAL STUDIES

UNIT 1

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

UNIT 2

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

UNIT 3

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

UNIT 4

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

UNIT 5

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

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

In

Computer

Course Structure

Second Year

Third Semester

Paper Code	Subject
BSCO1	Mathematics III
BSCO2	Switching Circuits & Logic Design
BSCO3	Signals & Networks
BSCO4	Digital Electronics
BSCO5	Electrical Machine

Syllabus

BSCO1 : MATHEMATICS III

1. PARTIAL DIFFERENTIATION AND PARTIAL DIFFERENTIAL EQUATION

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

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

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

2. PARTIAL DIFFERENTIAL EQUATIONS

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

3. FOURIER SERIES

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

4. LAPLACE TRANSFORMATION

Introduction, Laplace Transform, Important Formulae, Properties of Laplace Transforms, Laplace Transform of the Derivative of $f(t)$, Laplace Transform of Derivative of order n , Laplace Transform

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

5. NUMERICAL TECHNIQUES

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

6. NUMERICAL METHODS FOR SOLUTION OF PARTIAL DIFFERENTIAL EQUATION

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

BSC02 : SWITCHING CIRCUIT & LOGIC DESIGN

1. BOOLEAN ALGEBRA

Introduction, Binary Logic Functions, Logic Gates, Boolean Algebra, Universal Property, Conversion of AND/OR/NOT Logic to NAND/NOR Logic.

2. COMBINATIONAL LOGIC

Introduction, Switching Equations, Simplification of Boolean Expressions, Algebraic Simplification, Karnaugh Map Simplification – The Karnaugh Map, Quine – McCluskey or Tabular Method, NAND and NOR Implementation.

3. ANALYSIS & DESIGN OF COMBINATIONAL LOGIC

Introduction, Design Procedure, Code Conversion, Decoder, Multiplexer.

4. SEQUENTIAL LOGIC

Introduction, Flip-Flops, Triggering of Flip-Flops, Flip-Flop Conversions, Registers, Applications of Shift Registers, Counters, State table, Flip-Flop Excitation Tables, Design Procedure, Modulus N Synchronous Counter, UP/DOWN Synchronous Counters, Typical ICs for Counters.

5. SEQUENTIAL CIRCUITS

Introduction, Synchronous or Clocked Sequential Circuits, Sequence Generator, Asynchronous Sequential Circuits.

6. PROGRAMMABLE LOGIC

Introduction, Read Only Memory (ROM), Programmable Logic Array (PLA).

7. DIGITAL INTEGRATED CIRCUITS

Introduction, Definition of Parameters, TTL, Open Collector Outputs, Wired AND Connection, Comparison between TOTEM Pole Collector Output, Tri-State Logic and Bus Drivers, CMOS, Interfacing CMOS and TTL Devices.

BSCO3 : SIGNALS & NETWORKS

1. SIGNALS, SYSTEMS AND WAVEFORMS

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

2. LAPLACE TRANSFORMS

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

3. APPLICATIONS OF LAPLACE TRANSFORMS

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

4. NETWORK FUNCTIONS

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

5. TWO PORT NETWORKS

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

6. NETWORK TOPOLOGY

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

7. DRIVING POINT SYNTHESIS

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

BSCO4 : DIGITAL ELECTRONICS

1. NUMBER SYSTEMS AND CODES:

Binary Number System, Octal Number System, Hexadecimal Number System, Bits and Bytes , 1's and 2's Complements, Decimal -to- Binary Conversion, Decimal-to- Octal Conversion, Decimal -to- Hexadecimal Conversion, Binary -octal and Octal - Binary Conversions , Hexadecimal - Binary and Binary -Hexadecimal Conversion, Hexadecimal -Octal and Octal -Hexadecimal Conversion. BCD Code, Excess -3 Code , Gray code , Alphanumeric Codes ,Parity Bits, Hamming Code, Floating Point Numbers.

2. BINARY ARITHNETIC:

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

3. LOGIC GATES AND LOGIC FAMILIES:

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

4. BOOLEAN ALGEBRA AND MINIMISATION TECHNIQUES:

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

5. COMBINATIONAL LOGIC CIRCUITS:

Combinational Circuits, Implementing Combinational Logic, Arithmetic Circuits –Basic Building Blocks, Adder- Subtractor, BCD Adder, Carry Propagation- Look Ahead Carry Generator, Arithmetic Logic Unit (ALU), Multipliers, Magnitude Comparator, Parity Generator and Checker, Demultiplexers 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, Propagation 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),

BSC05 : ELECTRICAL MACHINES

1 INTRODUCTION

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

2 DC NETWORKS

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

3 TRANSFORMER

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

4 DC MACHINES

Construction and Principle of DC generation and DC Motor,
Back emf of DC Motor,
Types of DC Motor,
Reversal of Direction of Rotation of DC Motor,

Starting of DC Motor,
Characteristics of DC Motor,
Uses of DC Motor, Losses in DC Machine.

5 ALTERNATOR

Construction and Working principle of Alternator,
Application of Alternators.

6 SYNCHRONOUS MOTORS

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

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

In

Computer

Course Structure

Second Year

Fourth Semester

Paper Code	Subject
BSCO6	Society, Environment, Engineering
BSCO7	Electronic Devices & Circuit
BSCO8	Electrical Machine
BSCO9	Digital Electronics
BSCO10	Object Oriented Programming

Syllabus

BSCO6 : SOCIETY, ENVIRONMENT & ENGINEERING

1.DEFINITION AND SCOPE OF SOCIOLOGY:

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

2. BASIC SOCIOLOGICAL CONCEPT:

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

3. SOCIAL INSTITUTION:

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

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

4.SOCIAL CHANGE

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

5.SOCIAL CONTROL:

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

6. SOCIAL PROBLEMS:

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

7. CULTURE:

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

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

8. CAPITALISM , MARXISM AND SOCIALISM:

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

9.SOCIOLOGY AND TECHNICAL CHANGES:

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

10. HISTORICAL PERSPECTIVE:

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

11. TECHNOLOGY ASSESSMENT AND TRANSFER:

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

12.CYBERNETICS:

Introduction, what cybernetics is ? control system

13.ENGINEER IN SOCIETY:

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

14.INFLATION AND POVERTY:

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

15.ENVIRONMENTAL DEGRADATION AND CONTROL:

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

16.PLANT LAYOUT AND SITE SELECTION:

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

17. PERSONAL MANAGEMENT:

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

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

18.INDUSTRIAL ACTS:

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

19.STANDARDS:

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

20.FUNCTIONS OF MANAGEMENT:

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

BSC07 : ELECTRONIC DEVICES & CIRCUIT

1. MULTI STAGE TRANSISTOR AMPLIFIERS

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

2. TRANSISTOR POWER AMPLIFIERS

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

3. FEEDBACK AMPLIFIERS

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

4. SINUSOIDAL OSCILLATORS

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

5. TUNED AMPLIFIERS (RF AMPLIFIERS)

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

6. SWITCHING AND WAVE – SHAPING

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

7. SPECIAL POWER SUPPLIES

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

8. OPERATIONAL AMPLIFIERS

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

BSC08 : ELECTRICAL MACHINES

1 INTRODUCTION

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

2 DC NETWORKS

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

3 TRANSFORMER

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

4 DC MACHINES

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

5 ALTERNATOR

Construction and Working principle of Alternator,
Application of Alternators.

6 SYNCHRONOUS MOTORS

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

BSC09 : DIGITAL ELECTRONICS

2. 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 ARITHMETIC:

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 Division – Repeated Right Shift and Subtract Algorithm.

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.

7. BOOLEAN ALGEBRA AND MINIMISATION TECHNIQUES:

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

8. COMBINATIONAL LOGIC CIRCUITS:

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

9. 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, Propagation 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.

9. SEMI- CONDUCTOR MEMORY:

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

BSC010 : OBJECT ORIENTED PROGRAMMING

1. INTRODUCTION TO OOPS:

Characteristics of OOP, Classes; Objects, Inheritance; Reusability; Polymorphism; Dynamic Binding; Message Communication, Importance of OOPs over Structured Programming, Advantages of OOP, OOPs and C++, A Brief History of C; A Brief History of C++; C versus C++

2. BASIC PROGRAM CONSTRUCTION AND TOKENS:

Organization of a C++ Program , Comments; The main () function; The C++ preprocessor directives- # include; The Standard output stream- cout; White spaces , C++ Character Set , Tokens; Identifiers ; Keywords; Constants; Variable, Expressions, Comma- Separated Declarations, Input using cin, Cascading << and >>, Operators in Expressions, Precedence and Associativity, Type Conversion,

3. CONTROL STRUCTURES:

The if Statement, The if-else Statement, Nested if- else Statement, Logical Operators, The Conditional Operator, The switch Statement, The goto Statement, Loops, The while Loop, The do- while Loop, The for Loop, Nested Loop, The break Statement, The continue Statement.

4. FUNCTIONS:

Simple Functions, Functions Type, Call by Address, Call by Reference, The const Reference, Overloading Functions, Inline Functions.

5.NUMERIC ARRAYS AND STRINGS:

Arrays, Sorting Arrays, Two – dimensional Arrays, Matrices, Array of Strings.

6.STRUCTURES, UNIONS AND ENUMERATED DATA TYPES:

Concept of Structures, Nested Structures, Array of Structures, Structure and Functions, Unions, The typedef Statement.

7. POINTER AND DYNAMIC MEMORY ALLOCATION:

Pointers and Address, Pointer Variables, Array of Pointers, Pointers and Strings, Pointers to Pointers, Dynamic Memory Allocation.

8.CLASSES AND OBJECTS:

Designing a Class ; Class Objects, Member Function,Array of Objects, Constructor's, Overloaded Constructor, The Copy Constructor, Destructors,

9.OVERLOADED OPERATORS:

Overloaded Operators, Returning * this

10.INHERITANCE:

Derived Classes, Hierarchical Inheritance, Private, Protected , Multiple Inheritance,Consturctors in Multiple Inheritance, Multilevel Inheritance.

11. VIRTUAL FUNCTIONS:

Virtual Functions , Pure Virtual Functions, Abstract Classes, Operator Overloading and friends.

12.STREAMS AND FILES:

Streams and Buffers in C++ , The iostream Library, Output with cout, File I/O Streams, Ostreram Class, Writing Data to Files, The istreram Class, Reading Data from Files, Detecting End – Of- File, The fstream Class.

13. DATA STRUCTURES USING C++:

Linked Lists, Doubly Linked Lists, Stacks, Queues, Trees.

14.TEMPLATES:

Basic concept of Templates, A Stack Templates of Basic Data Types.

15.EXCEPTION HANDLING:

Exception Handling in C++, The try Block, catch Exception Handler, throw Statement, Nested try Blocks.

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

In

Computer Engineering

Course Structure

Third Year

Fifth Semester

Paper Code	Subject
BTCO1	Operating System
BTCO2	Database Management System
BTCO3	Computer Graphics
BTCO4	Computer Organization
BTCO5	Software Engineering

BTCO1 : OPERATING SYSTEM

1. COMPUTER ARCHITECTURE:

4 GL Program , 3GL (HLL)Program,

2. OPERATING SYSTEM FUNCTIONS:

What is an Operating Systems ? , Different Services of the Operating System, Uses of System Calls, The Issue of Protability, The Kernel

3. INFORMATION MANAGEMENT:

The file System, Device Driver (DD), Terminal I/O.

4. PROCESS MANAGEMENT:

What is Process , Evolution of Multiprogramme, Process States, Process Control Block (PCB), Create, Kill, Dispatch a Process,

5. INTER- PROCESS COMMUNICATION:

The Producer –Consumer Problems.

6. DEADLOCKS:

Deadlock Prerequisites, Deadlock Strategies,

7. MEMORY MANAGEMENT (MM):

Paging, Segmentation, Virtual Memory Management Systems,

8. OPERATING SYSTEMS: SECURITY AND PROTECTION:

Security Threats, Security Design Principles, Protection Mechanisms, Encryption, Security in Distributed Environment.

9. PARALLEL PROCESSING:

Operating Systems for Parallel Processes, Case Study: Mach

10. OPERATING SYSTEMS IN DISTRIBUTED PROCESSING:

Lan Environment and Protocols,

11. UNIX: A CASE STUDY:

Overview of UNIX, UNIX File System, Data Structure for Process / Memory Management, Executing and Terminating a Program in UNIX, Using the System (Booting and Login), Memory Management, Terms and Concepts Introduced, Test Questions.

BTCO2 : DATABASE MANAGEMENT SYSTEM

1. INTRODUCTION

Purpose Of Database Systems, Data Redundancy And Inconsistency, Difficulty Accessing Data

2. DATABASE SYSTEM ARCHITECTURE

Data Abstraction, Instances And Schemas, Data Independence, The Object-Oriented Model, Record-Based Logical Models, Physical Data Models, Database Languages, Data-Definition Language, Transaction Management, Storage Management, Database Administrator, Database Users, Summary

3. DATA MODELS

Using High-Level Conceptual Data Models For Database Design, Entities And Attributes, Network Model, Data-Structure Diagrams, Implementation Techniques, Relational Model, Keys Query Languages

4. INTEGRITY CONSTRAINTS

Domain Constraints, Referential Integrity, Basic Concepts, Referential Integrity In The E-R Model, Database Modification, Referential Integrity In SQL, Assertions, Triggers, Functional Dependencies, Closure Of A Set Of Functional Dependencies, Closure Of Attribute Sets, Canonical Cover

5. RELATIONAL ALGEBRA AND DATA MANIPULATION OPERATIONS

Introduction, Traditional Set Operations, Extended Cartesian Product, Attribute-Names For Derived Relations, Special Relational Operations, Projection, Join, Division, Summary

6. RELATIONAL QUERY LANGUAGES

The Tuple Relational Calculus, Tuple Variables And Range Relations, Expressions And Formulas In Tuple Relational Calculus, The Existential And Universal Quantifiers, Example Queries Using The Existential Quantifier, Transforming The Universal And Existential Quantifiers, Safe Expressions, Quantifiers In Sql, The Domain Relational Calculus, Basic Retrievals In Qbe

7. SQL

Introduction, Base Tables, Indexes, Retrieval Operations, Retrieval Of Computed Values, Built-In Functions, Update Operations

8. RELATIONAL DATABASE DESIGN

Domains And Attributes, Functional Dependencies, Transitive Closure, Inference Rules For Functional Dependencies, Equivalence Of Sets Of Functional Dependencies, Minimal Sets Of Functional Dependencies, Normal Forms Based On Primary Keys, First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form, Algorithms For Relational Database Schema Design, Decomposition And Lossless (Nonadditive) Joins

9. QUERY PROCESSING AND OPTIMIZATION

Overview, Catalog Information For Cost Estimation, Sorting, Join Operation, Estimation Of The Size Of Joins, Nested-Loop Join, Block Nested-Loop Join, Indexed Nested-Loop Join, Merge-Join, Hash-Join, Recursive Partitioning, Handling Of Overflows, Cost Of Hash-Join, Hybrid Hash-Join, Complex Joins, Duplicate Elimination, Projection, Set Operations, Outer Join, Aggregation, Pipelining, Implementation Of Pipelining, Evaluation Algorithms For Pipelining, Transformation Of Relational Expressions, Equivalence Rules, Examples Of Transformations, Choice Of Evaluation Plans, Interaction Of Evaluation Techniques, Cost-Based Optimization, Heuristic Optimization, Structure Of Query Optimizers

10. STORAGE STRATEGIES

Basic Concepts, Ordered Indices, Primary Index, Dense And Sparse Indices, Multilevel Indices, Index Update , Structure Of A B⁺-Tree, Queries On B⁺-Trees, Hash Functions, Hash Indices

11. TRANSACTION PROCESSING

Single-user versus multiuser systems, transactions, read and write operations, and dbms buffers, why concurrency control is needed, why recovery is needed, concurrency control techniques, guaranteeing serializability by two phase locking, dealing with deadlock and starvation, concurrency control based on timestamp ordering, timestamps, the timestamp ordering algorithm, multiversion technique based on timestamp ordering, multiversion two-phase locking using certify locks, granularity level considerations for locking, write-ahead logging, steal/no-steal, and force/no-force, checkpoints in the system log and fuzzy checkpointing, transaction rollback, recovery techniques based on deferred update, recovery using deferred update in a single-user environment, deferred update with concurrent execution in a multiuser environment, transaction actions that do not affect the database, recovery techniques based on immediate update, Undo/redo recovery based on immediate update in a single-user environment, undo/redo recovery based on immediate update with concurrent execution, procedure riu_m, shadow paging

12. ADVANCED TOPICS

New Database Applications, The Object-Oriented , Data Model, Object Classes, Inheritance, Multiple Inheritance, Object Identity, Object Containment, Object-Oriented Languages, Persistent Programming Languages, Persistent Programming Languages, Object Identity And Pointers, Storage And Access Of Persistent Objects, Persistent C++ Systems, The Odmg C++ Object-Definition Language, The Odmg C++ Object Manipulation Language, Object – Relational Databases, Inheritance, Nesting And Unnesting, Creation Of Complex Values And Objects

13. LOGICAL DATABASES

Introduction To Deductive Databases, Prolog/Datalog Notation, Datalog Notation, Clausal Form And Horn Clauses, Interpretation Of Rules, Basic Inference Mechanisms For Logic Programs, Bottom –Up Inference Mechanisms (Forward Chaining), Top- Down Inference Mechanisms (Backward Chaining), Deductive Database Systems, The LDL System

14. WEB DATABASES

Databases On The World Wide Web, Providing Access To Databases On The World Wide Web, The Web Integration Option Of Informix, The Oracle Webserver, Open Problems With Web Databases

15. DISTRIBUTED DATABASES

Distributed database concepts, parallel versus distributed technology, advantages of distributed databases, additional functions of distributed databases, data fragmentation, replication, and allocation techniques for distributed database design, types of distributed database systems,

16. DATA WAREHOUSING AND DATA MINING

Data Warehousing, Terminology And Definitions, Characteristics Of Data Warehouses, Data Modeling For Data Warehouses, Building A Data Warehouse, Typical Functionality Of Data Warehouses, Difficulties Of Implementing Data Warehouses, Open Issues In Data Warehousing, Data Mining, An Overview Of Data Mining Technology, Approaches To Other Data Mining Problems, Applications Of Data Mining

BTCO3 : COMPUTER GRAPHICS

1. INTRODUCTION

Overview Of Computer Graphics, Representing Pictures, Preparing Pictures For Presentation, Presenting Previously Prepared Pictures

2. GRAPHICS HARDWARE AND DISPLAY DEVICES

Storage Tube Graphics Displays, Calligraphic Refresh Graphics Displays, Raster Refresh Graphics Displays, Cathode Ray Tube Basics, Color Crt Raster Scan Basics, Video Basics, Interactive Devices

3. GRAPHIC PRIMITIVES – DRAWING LINES & CURVES

Introduction, Scan-Converting A Point, Scan-Converting A Straight Line, Scan-Converting A Circle, Scan-Converting An Ellipse, Scan-Converting Arcs And Sectors , Scan-Converting A Rectangle, Boundary

Block Transfer (Bitblt) Or Raster Operational Graphics , Side Effects Of Scan Conversion

4. 2D AND 3D TRANSFORMATIONS

2d Transformations, Homogeneous Coordinates And Matrix Representation Of 2d Transformations, Composition Of 2d Transformations, The Window-To-Viewport Transformation, Efficiency, Matrix Representation Of 3d Transformations

5. SEGMENTS AND THEIR APPLICATIONS

Polygon Surfaces, Polygon Tables, Curved Lines And Surfaces, Quadric Surfaces, Superquadrics, Blobby Objects, Spline Representations, Cubic Spline Interpolation Methods, Bezier Curves And Surfaces, B-Spline Curves And Surfaces, Beta-Splines, Rational Splines, Conversion Between Spline Representations, Displaying Spline Curves And Surfaces, Sweep Representations

6. GEOMETRIC MODELLING

Geometric Models, Hierarchy In Geometric Models, Interconnections, Characteristics Of Retained-Mode Graphics Packages, Defining And Displaying Structures

7. BOUNDARY REPRESENTATIONS, CONSTRUCTIVE SOLID GEOMETRY AND SPATIAL DATA STRUCTURES

Polyhedra And Euler's Formula, The Winged-Edge Representation, Boolean Set Operations, Spatial-Partitioning Representations, Constructive Solid Geometry, Comparison Of Representations, User Interfaces For Solid Modeling

8. HIDDEN SURFACE AND LINE ELIMINATION

Classification Of Visible-Surface Detection, Back-Face Detection, Depth-Buffer Method, A-Buffer Method, Scan-Line Method, Depth - Sorting Method, Bsp-Tree Method, Area-Subdivision Method, Octree Methods, Ray-Casting Method, Curved Surfaces, Wireframe Methods, Visibility-Detection Function

9. RENDERING

Light Sources, Basic Illumination Models, Displaying Light Intensities, Halftone Patterns And Dithering Techniques, Polygon-Rendering Method, Ray-Tracing Methods, Radiosity Lighting Model, Environment Mapping, Adding Surface Detail, Modeling Surface Detail Polygon

10. VIDEO GAMES AND COMPUTER ANIMATION

Conventional And Computer-Assisted Animation, Animation Languages, Methods Of Controlling Animation, Basic Rules Of Animation, Problems Peculiar To Animation

BTCO4 : COMPUTER ORGANIZATION

1. INTRODUCTION

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

2. BASIC ORGANIZATION AT THE COMPUTER

gates, cpu organization

3. ROLE OF OPERATING SYSTEMS AND COMPILERS

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

4. INSIDE A CPU

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

5. COMPUTER ARITHMETIC AND THEIR IMPLEMENTATION

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

6. MEMORY AND IO ACCESS

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

7. INSIDE THE MEMORY

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

8. INTRODUCTION TO PIPELINED OPERATION AND ARCHITECTURE

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

9. INTRODUCTION TO MULTIPROGRAMMING AND MULTIPROCESSING

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

10. NON VON NEUMANN ARCHITECTURES

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

BTCO5 : SOFTWARE ENGINEERING

1. INTRODUCTION

Objects, The Evolving Role Of Software, Software, Software: A Crisis On The Horizon ?, Software Myths, Brooks, The Process, Object, Software Engineering: A Layered Technology, The Software Process

2. SOFTWARE LIFE-CYCLE MODELS

The Linear Sequential Model, The Prototyping Model, The Rad Model, Evolutionary Software Process Models, Component-Based Development, The Formal Methods Model, Fourth Generation Techniques, Process Technology, Product And Process

3. SOFTWARE REQUIREMENTS SPECIFICATION

Requirements Definition, Requirements Specification, Structured Language Specifications, Summary

4. FORMAL REQUIREMENTS SPECIFICATION – AXIOMATIC AND ALGEBRAIC SPECIFICATION.

Formal Specification On Trial, The Verdict, Transformational Development, Specifying Functional Abstractions, Primitive Constructor Operations, Structured Specification, Specification Instantiation, Incremental Development, Specification Enrichment
Axiomatic Specification, Summary

5. FUNCTION-ORIENTED SOFTWARE DESIGN

Data-Flow Design, Structural Decomposition, Detailed Design, A Comparison Of Design Strategies

6. OBJECT-ORIENTED DESIGN

The Object-Oriented Paradigm, Object Orientation And Autonomy, Object-Oriented Implementations, Object Orientation And Development, Object Structure, Object Features, Classes And Objects, Notation, Links And Composition, Developing Object Models, Inheritance, Polymorphism, Multiple Inheritance, Object Analysis In The Development Cycle, Designing Objects, Including Object Orientation In Life Cycles, Object Libraries, Problem Domain Analysis, Continual Refinement

7. UML

, Modeling Techniques On UML, What Is A Model?, Why Construct A Model?, UML Diagrams, Use Case Model, Representation Of Use Cases, Text Description, Why Develop The Use Case Diagram?, How To Identify The Use Cases Of A System?, Essential Vs. Real Use Case, Factoring Of Commonality Among Use Cases, Generalization, Includes, Extends, Organization Of Use Cases, Use Case Packaging, Class Diagrams, Classes, Attributes, Operation, Association, Aggregation, Composition, Inheritance, Dependency, Constraints, Object Diagrams, Interaction Diagrams, Sequence Diagram, Collaboration Diagram, Activity Diagrams, State Chart Diagram

8. USER INTERFACE DESIGN

Introduction, What Makes A Good Interface?, Workspaces, Robustness, Usability, Measuring Usability, Designing For Usability, Interactive Interfaces, User Dialog For Transactions, Menus, Commands And Prompts, Templates, Comparing Dialog Methods For Transaction Processing, Controls For Interactive Transaction Input, Interaction For Problem Solving, Multi-Window Displays, Multimedia Displays, Interfaces For Personal Support, Interfaces For Workgroups, Interface Design Tools, Off-Line Processing, Off-Line Input Interface, Controls With Off-Line Input, Off-Line Output

9. CODING

Coding, Coding Standards And Guidelines, Representative Coding Standards, Representative Coding Guidelines, Code Review, Code Walk-Throughs, Code Inspection, Clean Room Testing, Software Documentation

10. UNIT TESTING, INTEGRATION AND SYSTEM TESTING.

Objects, A Strategic Approach To Software Testing, Strategic Issues, Unit Testing, Integration Testing, Validation Testing, System Testing, The Art Of Debugging

11. SOFTWARE QUALITY- SEI CMM AND ISO-9001

ISO 9000, ISO 9001, ISO 9002, software quality, software quality, management system, SEI capability maturity model, comparison between ISO 9000 certification and SEI/CMM, is SEI CMM applicable to small organizations?, personal software process (PSP)

12. SOFTWARE RELIABILITY AND FAULT-TOLERANCE

Software Reliability Metrics, Software Reliability Specification, Fault Tolerance , Exception Handling

13. SOFTWARE PROJECT PLANNING, MONITORING AND CONTROL

Objects, Observation On Estimating, Project Planning Objective, Software Scope, Resources, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Staffing Level Estimation, Defining A Task Network, Scheduling, Earned Value Analysis, Error Tracking, The Project Plan

14. SOFTWARE MAINTENANCE

The Maintenance Process, Program Evolution Dynamics, Maintenance Costs, Maintenance Cost Estimation, Maintainability Measurement, Summary

15. COMPUTER-AIDED SOFTWARE ENGINEERING

Intelligent Design Support, User-Friendliness, Tool Integration, Using Tools In System Development, Developing A Methodology, Structred Systems Analysis – A Data Flow- Oriented Methodology, Ssadm- A Methodology Combining Data Alysis And Data Flows, Ssadm Techniques, Ssadm Documentation, Flexible Use Of Tools , Excelerator, Tools For Information Engineerin A Flexible Workbench, Planning Workstation, The Designer's Workstation, The Information Engineering Facility- Another Method For Implementing Information Engineering, Using Packages, Workflow Languages

16. SOFTWARE REUSE

Software Development With Reuse, Software Development For Reuse, Reuse And Inheritance, Generator-Based Reuse, Application System Portability, Portability Problems, Standards, Summary

17. COMPONENT MODEL OF SOFTWARE DEVELOPMENT

Engineering Of Component-Based Systems, The Case Process, Domain Engineering, Component-Based Development, Classifying And Retrieving Components, The Reuse Environment

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

In

COMPUTER SCIENCE

Course Structure

Third Year

Sixth Semester

Paper Code	Subject
BTCO6	Computer Network
BTCO7	Theory of Computation
BTCO8	Micro-processor
BTCO9	Principles of Programming
BTCO10	Industrial Economics & Management

BTCO6 : COMPUTER NETWORK

Chapter 1: Communication Networks and Services

Network functions and network topology, basics of message switching and cell switching.

Chapter 2: Application and Layered Architectures

Layering architecture, the OSI reference model, unified view of layers, protocols and overview of TCP/IP architecture, TCP/IP protocol.

Chapter 3: Telephone Network

Frequency division and time division multiplexing, synchronous optical network (SONET), SONET multiplexing, space division and time division circuit switches, Telephone integrated services digital network, network channel signaling and routing control.

Chapter 4: Peer-to-Peer Protocols

Peer-to-Peer protocols and service models, service models, end to end requirement adaptation functions, end-to-end versus hop by hop. ARQ protocols, stop and wait back-N ARQ, selective repeat ARQ, transmission efficiency of ARQ protocols, sliding flow control, timing recovery for synchronous services, reliable stream service, data controls, HDLC data link control, point protocol, statistical multiplexing.

Chapter 5: Local Area Network

Multiple access communications, local area networks (LAN) structure, the medium control sub layer, random access, ALOHA, slotted ALOHA, CSMA/CD, scheduling approaches to medium access control, reservation systems, token passing rings, comparison of random access and scheduling medium access, IEEE 802.3 standards for 10 Mbps and 1000 Mbps LAN's, repeaters and hubs, LAN transparent bridges, source routing, link state versus distance vector routing, shortest path algorithms, the Bellman-Ford algorithm, Dijkstra's algorithm, other routing approaches.

Chapter 6: Packet Switching Networks

Network services and internal network operation, packet network topology, connectionless packet switching, virtual circuit packet switching, routing in packet networks, routing algorithm classification, routing tables, hierarchical routing, link state versus distance vector routing, shortest path algorithms, the Bellman-Ford algorithm, Dijkstra's algorithm, other routing approaches.

Chapter 7: Frame Relay and Asynchronous Mode (ATM)

Frame relay protocol architecture, frame relay call control, user data transfer network function congestion control, ATM architecture, logical connection, ATM cells, transmission of ATM cells, ATM adaptation layers, ATM traffic management and QoS, FIFO and priority queues, congestion control, open loop control, closed loop control.

Chapter 8: TCP/IP

The Internet Protocol (IP), IP packet, IP addressing, subnet mask, classless interdomain routing (CIDR), address resolution, reverse address resolution, IP fragmentation and reassembly, ICMP, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), TCP reliable stream services, TCP operation, TCP protocol, Dynamic Host Configuration Protocol (DHCP), mobile IP, IPv6, Internet routing protocols, routing information protocols, open shortest path first protocol, border gateway protocol, multicast routing, reverse path broadcasting, internet group management protocol, reverse path multicasting, distance vector multicast routing protocol.

BTCO7 : THEORY OF COMPUTATION

Chapter 1: Introduction Sets.

Chapter 2: Relations and Languages:

Sets, Relations and functions, Special types of binary relations, Finite and infinite sets, Three fundamental proof techniques, Closures and algorithms, Alphabets and languages, Finite representations of languages.

Chapter 3: Finite Automata:

Deterministic finite automata, Nondeterministic finite automata, Finite automata and regular expressions, Languages that are and are not regular, State minimization, Algorithmic aspects of finite automata.

Chapter 4: Context-Free Languages:

Context – Free grammars, Parse trees, Pushdown automata, Pushdown automata and context-free grammars, Languages that are and are not context – free, Algorithms for context-free grammars, Determinism and parsing,

Chapter 5: Turning machines:

The definitions of a turning machine, Computing with Turing machines, Computing with turning machines, Extensions of turning machines, Random access turning machines, Nondeterministic turning machines, Grammars, Numerical Functions.

Chapter 6: Undecidability:

The church – Turning thesis, Universal Turing machines, The halting problem, Unsolvable problems about turning machines, unsolvable problems about grammars, An unsolvable tiling problem , Properties of recursive languages.

Chapter 7: Computational Complexity:

The class, Problems, problems , Boolean Satisfiability , The Class NP.

Chapter 8: NP-Completeness: Polynomial –time reductions, Cook's Theorem, More NP-complete problems, Coping with NP-completeness.

BTCO8 : MICRO- PROCESSOR

Chapter 1: Microprocessor Architecture and Microcomputer Systems:

Microprocessor Architecture and Its Operations, Memory, Input and output(I/O) Devices, Example of a Microcomputer System, Review Long Devices for Interfacing.

Chapter 2: 8086 Microprocessor Architecture and Memory Interfacing :

The 8085 MPU, Example of an 8085-Based Microcomputer, Memory Interfacing, The 8085 Memory System, How Does an 8085-Based Single-Board Microcomputer Work?

Chapter 3: Interfacing I/O Devices:

Basic Interfacing Concepts, Interfacing Output displays, Interfacing Input Devices, Memory-Mapped I/O, Testing and Troubleshooting I/O Interfacing Circuits.

Chapter 4: Interrupts:

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

Chapter 5: Interfacing Data Converters:

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

Chapter 6: SDK-85 Programmable Interface Devices:

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

Chapter 7: General-Purpose Programmable peripheral Devices:

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

Chapter 9: Serial I/O and Data Communication:

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.

Chapter 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.

BTC09 : PRINCIPLES OF PROGRAMMING

1. LANGUAGES DESIGN ISSUES

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

2. IMPACT OF MACHINE ARCHITECTURES

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

3. ELEMENTARY DATA TYPES

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

4. ENCAPSULATION

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

5. INHERITANCE

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

6. SEQUENCE CONTROL

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

7. SUBPROGRAM CONTROL

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

BTCO 10: INDUSTRIAL ECONOMICS AND MANAGEMENT

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

In

COMPUTER SCIENCE

Course Structure

Fourth Year

Seventh Semester

Paper Code	Name of the Subject
BECO1	Pattern Recognition & Application
BECO2	Digital Signal Processing
BECO3	Data structures & Object Representation
BECO4	Advanced Computer System Architecture
BECO5	Elective-I
BECO2P	Digital Signal Processing Practical
BECO4P	Advanced Computer System Architecture Practical

BECO1: PATTERN RECOGNITION & APPLICATION

CHAPTER 1: APPLICATIONS OF PATTERN RECOGNITION: Statistical Decision Theory; Image Processing and Analysis;

CHAPTER 2: STATISTICAL DECISION MAKING: Decision Boundaries, Estimation of Error rates, Estimating the Composition of Populations; Nearest Neighbor Classification Techniques; Choosing a Decision Making Technique;

CHAPTER 3: CLUSTERING: Hierarchical, Partitional; Geometric Image Scaling and Interpolation; Smoothing Transformations; Logarithmic Gray Level Scaling; The Statistical Significance of Image Features; Image

CHAPTER 4: ANALYSIS: Hough Transforms, Shapes of Regions, Morphological Operations , Texture, System Design, Image Sequences, Image Compression.

BECO2: 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.

BECO3 : DATA STRUCTURES AND OBJECT REPRESENTATION

CHAPTER 1: ABSTRACT DATA TYPES: ADT Specification; Efficiency of Algorithms;

CHAPTER 2: ALGORITHMIC ANALYSIS: Worst-Case, Average- Case; Matrix ADT Implementation in C; Classes and Objects; Sequential Mapping ; Linked List Implementation; Dynamic Set Operations; The Stack and Queue ADTs ; Hash Tables; Hash Functions; Analysis of Uniform Hashing; The Priority Queue ADT; Graph Problems; Breadth-First Search; Depth- First Search; Shortest Paths;

CHAPTER 3: AMORTIZED ANALYSIS: Accounting Method, Potential Method; Splay Trees;

CHAPTER 4: NON AMORTIZED DATA STRUCTURES – Binary Heaps; Amortized Data Structures – Skew Heaps, Lazy Binomial Heaps ; List-Based Data Structures; Quad Trees; The Disjoint-Set ADT.

BECO4 : ADVANCED COMPUTER SYSTEM ARCHITECTURE

CHAPTER 1: INTRODUCTION

CHAPTER 2: CENTRAL PROCESSING UNIT: CISC Characteristics, RISC Characteristics

CHAPTER 3: PIPELINE AND VECTOR PROCESSING: Pipelining, Arithmetic Pipeline, Vector Processing, Array Processors, SIMD Array Processor

4: MULTIPLICATION ALGORITHMS: Introduction, addition & subtraction, multiplication algorithms, hardware implementation for signed-magnitude data, hardware algorithm, Booth multiplication algorithm, array multiplier, divide overflow, floating-point arithmetic operation, multiplication, division, floating-point operations

CHAPTER 5: Asynchronous Data Transfer: Strobe Control, Handshaking, Direct Memory Access (DMA)- DMA Controller, DMA Transfer

CHAPTER 6: MEMORY ORGANIZATION: Memory Hierarchy, Cache Memory-Associative Mapping, Direct Mapping, Set Associative Mapping, Virtual Mapping, Memory Management Hardware

CHAPTER 7: MULTIPROCESSORS: Interconnection structures- Time Shared Common Bus; Multiport Memory; Crossbar Switch; Multistage Switching Network; Hypercube Interconnection, Dynamic Arbitration Algorithms, Cache Coherence-Conditions for Incoherence, Solutions to the Cache Coherence Problem, problems

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

In

COMPUTER

Course Structure

Fourth Year

Seventh Semester

ELECTIVE – I

Paper Code	Name of the Subject
BECO5-I	Neural Network & Application
BECO5-II	Parallel Processing
BECO5-III	Mobile Computing
BECO5-IV	Fuzzy Set Theory & Application

BECO5-I: NEURAL NETWORK & APPLICATION

1. BIOLOGICAL NEURAL NETWORKS:

Neuron Physiology: Factors Affecting Potassium- Ion Flow, Neuronal Diversity, Specification of the Brain; The Eye's Neural Network: Retina Structure , Image Processing in the Rectina.

2. ARTIFICIAL NEURAL NETWORKS: CONCEPTS:

Neural Attributes: Artificial Neural Networks, Learning in Artificial Neural Networks: The Delta Rule , Artificial Neural Network Topologies, Algorithms; ANN Adaptability.

3. FUZZY LOGIC:

Propositional Logic , Fuzzy Logic , Time- Dependent Fuzzy Logic: Crisp Logics , Temporal Fuzzy Logic (TFL) , Applying Temporal Fuzzy Operators, Defuzzification of Temporal Fuzzy Logic, Example: Applicability of TFL in Communication Systems.

4. FUZZY NEURAL NETWORKS:

Fuzzy Artificial Neural Network (FANN) , Fuzzy Neural Example, Neuro – Fuzzy Control: Traditional Control; Neural Control;; Fuzzy Control; Fuzzy- Neural Control

5. APPLICATIONS:

Signal Processing; Image Data Processing: Handwritten Character Recognition; Visual Image Recognition , Communications Systems: Call Processing ; Switching Traffic Control ; Packet Radio Network Routing , Intelligent Control , Tools and Companies

BECO5-II: PARALLEL PROCESSING

1. INTRODUCTION:

Why Parallel Processing? Shared Memory Multiprocessing, Distributed Memory

2. PARALLEL PROCESSING ARCHITECTURES:

Parallelism In Sequential Machines, Abstract Model Of Parallel Computer, Multiprocessor Architecture, Pipelining, Array Processors.

3. PROGRAMMABILITY ISSUES:

An Overview, Software Tools.

4. DATA DEPENDENCY ANALYSIS:

Types Of Dependence, Loop And Array Dependence, Loop Dependence Analysis, Solving Diophantine Equations, Program Transformations

5. THREAD –BASED IMPLEMENTATION:

Thread Management, Example With Threads, Attributes Of Threads, Mutual Exclusion With Threads, Mutex Usage Of Threads, Thread Implementation, Java Threads.

6. DISTRIBUTED COMPUTING –II: REMOTE PROCEDURE CALL:

Parameter Passing, Locating The Server

7. ALGORITHMS FOR PARALLEL MACHINES:

Speedup, Complexity And Cost, Parallel Reduction, Quadrature Problem, Matrix Multiplication, Parallel Sorting Algorithms, Solving Linear Systems, Probabilistic Algorithms.

8. DISTRIBUTED DATA BASES:

Objectives, Distribution Options, Database Integrity, Concurrency Control, DBMS Structure.

9. DISTRIBUTED OPERATING SYSTEMS:

Network Operating Systems.

BECO5-III: MOBILE COMPUTING

1. INTRODUCTION

Applications, Replacement of wired networks, Location dependent services, Mobile and wireless devices, A short history of wireless communication, A market for mobile communications, Some open research topics, A simplified reference model

2. MOBILE CHANNEL CHARACTERIZATION

Fading and shadowing, communication issues , antennas, signal propagation, path loss of radio signals, multipart propagation, multiplexing, space division multiplexing, frequency division multiplexing, time division multiplexing, code division multiplexing, modulation, advanced frequency shift keying, multicarrier modulation , direct sequence spread spectrum,

3. REVIEW OF CELLULAR SCHEMES

Model and methodology, mobile computing topologies, networks and protocols, GSM, system architecture, network and switching subsystem, operation subsystem, radio interface, logical channels and frame hierarchy, handover, authentication, encryption , hscsd, umts and imt-2000, umts basic architecture, ultra fod mode, ultra tdd mode, SDMA, FDMA, TDMA.

4. MOBILITY MANAGEMENT

Mobile ip, entities and terminology, ip packet delivery, agent advertisement and discovery, optimizations, dynamic host configuration protocol, fast retransmit/fast recovery, transaction oriented TCP.

5. WIRELESS LAN AND DATA PCS, WIRING THE CAMPUS

Infrared vs. Radio transmission, infrastructure and ad hoc networks , direct sequence spread spectrum, medium access control layer, basic DFWMAC-DCF using CSMA/CA, user scenarios, mac layer, packet format, link management,

6. APPLICATION FRAMEWORKS

Architectures now and in the future, today's application architectures, architecture overview, service enablers, *service capability servers*, *application support servers*, personal service environment, personal service environment, service management,

7. EXPLOITING MOBILITY COMMERCIALLY

Location-based services, positioning methods, terminal-based positioning: gps and a-gps, enhanced observed time difference (e-otd), network-based positioning: ul-toa, which solutions will we use, and what are the consequences?,

8. FILE SYSTEM, ACCESSING THE WORLD WIDE WEB

File systems, little work, ficus, mio-nfs, accessing the world wide web , hypertext markup language, some approaches that might help wireless access, system architectures, wireless application protocol, wireless data gram protocol, wireless transaction protocol, wsp/b over wtp, wsp/b as connectionless session service, wireless markup language, **WTP class 0**, **WMLScript**

9. PRIVACY AND ANONYMITY

How secure does it have to be?, securing the transmission, authentication, encryption, protecting the message integrity, gsm/gprs/3g network security, algorithm decision, security protocols and their wirelessusage, redundant security, making decisions and security perspectives.

BECO5-IV: FUZZY SET THEORY & APPLICATION

1. FUZZY SET THEORY

Introduction, Background, Uncertainty and Imprecision, Statistics and Random Processes, Uncertainty in Information, Fuzzy Sets and Membership, Chance Versus Ambiguity

2. FUZZY SETS-BASIC DEFINITIONS AND EXTENSIONS

Crisp Versus Fuzzy Sets, Example 1 Fuzzy Sets Versus Crisp Sets, Form Fuzzy Sets To Fuzzy Events, Fuzzy Set Operations, Properties Of Fuzzy Sets, Fuzzification Techniques, Alpha Cuts

3. MEASURE OF FUZZYNESS

Fuzzy Measures, Belief And Plausibility, Evidence Theory, Probability Measures

4. THE EXTENSION PRINCIPLE AND APPLICATIONS, FUZZY NUMBERS

Extension Principle, Fuzzy Transform (Mapping), Fuzzy Numbers, Interval Analysis In Arithmetic, Approximate Methods Of Extension, DSW Algorithm

5. FUZZY RELATIONS AND FUZZY GRAPHS

Fuzzy Relations On Sets And Fuzzy Sets, Compositions Of Fuzzy Relations, Properties Of The Min-Max Composition , Reflexivity, Symmetry, Transitivity, Fuzzy Graphs , Special Fuzzy Relations

6. FUZZY ANALYSIS

Fuzzy Functions On Fuzzy Sets, Extrema Of Fuzzy Functions, Integration Of Fuzzy Functions, Integration Of A (Crisp) Real- Valued Function Over A Fuzzy Interval, Fuzzy Differentiation

7. POSSIBILITY THEORY, FUZZY POSITIONING

Possibility Distributions as Fuzzy Sets, Fuzzy Positioning, Image Stabilization For Camcorders, Television Sets

8. FUZZY APPROXIMATE REASONING

Fuzzy Logic, Approximate Reasoning, Fuzzy Tautologies, Contradictions, Equivalence, and Logical Proofs, Other Forms of the Implication Operation, Other Forms of The Composition Operation

9. EXPERT SYSTEMS

Fuzzy Set and Expert Systems, Introduction to Expert Systems

10. FUZZY CONTROL

Review Of Control System Theory, Simple Fuzzy Logic Controllers, General Fuzzy Logic Controllers, Special Forms Of Fuzzy Logic Control System Models, Examples Of Fuzzy Control System Design, Classical Fuzzy Control Problem: Inverted Pendulum

11. PATTERN RECOGNITION, FUZZY SCENE ANALYSIS, FUZZY GRAMMARS AND AUTOMATA

Feature Analysis, Partitions of The Feature Space, Single Sample Identification, Multifeature Pattern Recognition, Fuzzy Scene Analysis, Syntactic Recognition

12. DECISION MAKING IN FUZZY ENVIRONMENT, FUZZY LINEAR AND GOAL PROGRAMMING

Fuzzy Decisions, Fuzzy Linear Programming, Symmetric Fuzzy LP, Fuzzy Dynamic Programming, Fuzzy Multi Criteria Analysis.

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

In

COMPUTER SCIENCE

Course Structure

Fourth Year

Eighth Semester

Paper Code	Name of the Subject
BECO6	Design principle of language Translator
BECO7	Design & Analysis of Algorithm
BECO8	Interactive multimedia
BECO9	Project
BECO7P	Design & Analysis of Algorithm

BECO6 : DESIGN PRINCIPLE OF LANGUAGE TRANSLATOR

1. INTRODUCTION

Systems Programs and Translators, the Relationship between High-Level Languages and Translators

2. OVERVIEW OF COMPILER STRUCTURE

Compilers, the analysis-synthesis model of compilation, analysis of the source program, lexical analysis, semantic analysis, analysis in text formatters, the phases of a compiler, symbol-table management, error detection and reporting, the analysis phases, intermediate code generation, code optimization, code generation, code generation, assemblers, two-pass assembly, loaders and link-editors, the grouping of phases, compiler-construction tools

3. BASICS OF GRAMMAR THEORY

Equivalent grammars , some simple restrictions on grammars , useless productions and reduced grammars , cycle-free grammars , ambiguous grammars , context sensitivity , the chomsky hierarchy , bnf description of clang , ebnf description of clang , a sample program .

FINITE STATE AUTOMATA AND LEXICAL ANALYSIS

Abstract machines, the role of the lexical analyzer, issues in lexical analysis, tokens, patterns, lexemes, attributes for tokens, input buffering, buffer pairs, specification of tokens.

5. SPECIFICATION AND RECOGNITION OF CONTEXT FREE GRAMMARS

Context-free grammars, generating strings from a cfg, cfgs with epsilon productions, finding all the strings generated by a cfg, cfgs vs regular expressions, simulating a regular expression with a cfg, a cfg with no corresponding re

6. PARSING TECHNIQUES

Top-down parsing, recursive-descent parsing, predictive parsers, translation diagrams for predictive parsers, no recursive predictive parsing, first and follow, bottom-up parsing, handles, handle pruning, stack implementation of shift-reduce parsing, viable prefixes, operator-precedence parsing, using operator-precedence relations, operator-precedence relations from associativity and precedence, precedence functions, lr parsers, constructing

slr parsing tables

7. SYNTAX DIRECTED TRANSLATION

Embedding semantic actions into syntax rules, attribute grammars, synthesized and inherited attributes, classes of attribute grammars

8. SEMANTIC ACTIONS AND INTERMEDIATE CODES

Intermediate languages, graphical representations, three-address code, types of three-address statements, syntax-directed translation into three-address code, implementations of three-address statements

9. STATIC AND DYNAMIC STORAGE MANAGEMENT

Static and dynamic memory allocation, array allocation and access, a simple static array allocation scheme

10. ERROR DETECTION AND RECOVERY

Classification of errors, lexical and syntax errors, duplicate messages, recovery from syntax errors, regarding a safe parser state, semantic errors, the error print routine, desirable place for printing error messages, invalid number of dimensions for 'h' in statements, object modules and compilation errors, detection of run time errors, indication of run time errors, overflow in statement number 0052 of procedure xyz., programmer recovery options, debugging aids and options, combining different language routines

11. CODE GENERATION AND OPTIMIZATION

Issues in the design of a code generator, the target machine, peephole optimization, code optimization, introduction, criteria for code-improving transformation, the principal sources of optimization, dead-code elimination, induction variables and reduction in strength, optimization of basic blocks

12. INTRODUCTION TO NATURAL LANGUAGE TRANSLATION

Introduction, what is understanding?, what makes understanding hard?, complexity of the target representation, type of mapping, level of interaction among components, conclusion: English is hard, understanding single sentences, understanding words, understanding sentences-syntax, semantics, pragmatics, keyword matching, syntactic analysis, classes of grammars and languages, semantic analysis, semantic grammars, conceptual dependency.

BECO7: DESIGN & ANALYSIS OF ALGORITHM

1. INTRODUCTION

2. THE BASIC STEPS IN THE DEVELOPMENT OF AN ALGORITHM

The Problem-Solving Aspect, Implementation Of Algorithms, Program Verification, The Efficiency Of Algorithms, The Order Notation

3. SOME DATA STRUCTURE

Stacks and queues, trees, binary trees, heaps and heapsort, graphs, hashing.

4. ELEMENTARY NOTIONS FROM PROBABILITY AND STATISTICS

Probability, Axioms Of Probability, Discrete Probability Distributions, Bayes's Theorem, Discrete Random Variables, Statistics, Linearity, Arithmetic Series

5. HEURISTICS: TRAVELING SALESPERSON PROBLEM

Traveling Salesperson Problem, Efficiency Considerations

6. BRANCH AND BOUND PROBLEM

The Method, Lc-Search, Control Abstractions For Lc-Search, Properties Of Lc-Search, Bounding, Lc Branch-And-Bound

7. RECURSION AND BACKTRACK PROGRAMMING

Introduction, When Not To Use Recursion, Two Examples Of Recursive Programs, Backtrack Programming, The Eight Queens Problem, The Stable Marriage Problem, The Optimal Selection Problem

8. SHORTEST PATHS PROBLEM

Unweighted Shortest Paths, Dijkstra's Algorithm, Acyclic Graphs, Prim's Algorithm, Kruskal's Algorithm

9. SORTING

General Background, Efficiency Consideration, Efficiency Of Sorting, Exchange Sorts, Quicksort, Efficiency Of Quick Sort, Binary Tree Sorts, Heapsort, Insertion Sorts, Shell Sort

10. SEARCHING

Basic Search Techniques, Algorithmic Notation, Sequential Searching, Efficiency Of Sequential Searching, Reordering A List For Maximum Search Efficiency, Indexed Sequential Search, Binary Search, Interpolation Search

11. ARITHMETIC AND LOGICAL EXPRESSIONS

The General Method, Evaluation And Interpolation, Interpolation

12. SETS AND SOME BASIC SET ALGORITHMS

Sets, Relations, Functions, Sets And Disjoint Set Union

BECO8 INTERACTIVE MULTIMEDIA

- 1. INTRODUCTION OF MULTIMEDIA:** What is Multimedia?, Introduction to making multimedia, Multimedia skills
- 2. MULTIMEDIA BUILDING BLOCKS:** Text, Sound, Images, Animation, Video
- 3. MULTIMEDIA HARDWARE AND SOFTWARE:** Macintosh and windows Production platforms, Basic software Tools, Multimedia Authoring tools
- 4. MULTIMEDIA AND THE INTERNET:** The Internet and How it Works, Tools for the World Wide Web, Designing for the World Wide Web Assembling and delivering a project: Planning and Costing, Designing and producing, Content and Talent

BECO9P:-Project Guideline

Thinking up a Project

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

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

Methodology (main steps to carry out a project), expected output and organization where you intend to carry out the project.

Arranging a Guide

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

with the Guide

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

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

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

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

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

Some 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.