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

Course Structure First Year
(Common for all streams)

First Semester

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

SYLLABUS

BF1 : MATHEMATICS I

1 : LIMITS AND CONTINUITY OF A FUNCTION.

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

3 : SUCCESSIVE DIFFERENTIATION
Calculation of nth derivative, Leibnitz's theorem.

4 : GENERAL THEOREMS, EXPANSION OF FUNCTIONS.
Rolle's Theorem, Mean value theorem (Lagrange's form), Increasing and Decreasing functions, Mean value theorem (Cauchy's form).
Expansion of functions;
Taylor's expansion theorem, Maclaurin's theorem, Taylor's and Maclaurin's infinite series.

5 : INDETERMINATE FORM

L' Hospital's rule, Evaluation of % form, Evaluation of $\frac{\infty}{\infty}$ form, Evaluation of $\infty - \infty$ form, Evaluation of 0^0, 1^{∞}, ∞^0 form.

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

7 : MAXIMA AND MINIMA
Maximum and Minimum values of a function.

8 : ELEMENTARY INTEGRATION
Table of elementary integrals, Simple examples.

9 : INTEGRATION BY SUBSTITUTION

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

10 : INTEGRATION BY PARTS

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

11 : INTEGRATION BY PARTIAL FRACTIONS

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

12 : INTEGRATION OF IRRATIONAL ALGEBRAIC FUNCTIONS

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

13 : INTEGRATION OF TRIGNOMETRIC FUNCTIONS

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

14 : REDUCTION FORMULA

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

15 : DEFINITE INTEGRALS

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

16 : AREAS OF PLANE CURVES

17 : VOLUMES AND SURFACES OF SOLIDS OF REVOLUTION

18 : LENGTHS OF PLANE CURVES

Arc Formulae, Arc formulae for polar equations.

19 : SIMPSON'S RULE

<u>BF2 : CHEMISTRY</u>

1. WATER TREATMENT:

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

2. FUELS

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

3. LUBRICANTS

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

4. POLYMERS AND PLASTICS

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

Questions.

5. THERMODYNAMICS

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

6. CORROSION

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

7. ENVIRONMENTAL POLLUTION CHEMISTRY

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

8. METALLIC BOND AND SEMICONDUCTORS

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

BF3 : ENGLISH FOR COMMUNICATION

1. THE COMMUNICATION EVENTS

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

2. SUMMARIZATION

Summary Writing

3. COMPREHENSION AND VOCABULARY

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

4. PRINCIPLE OF LANGUAGE GRAMMAR AND USAGES

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

5. BASIC OFFICIAL CORRESPONDENCE

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

6. TECHNICAL WRITING

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

BF4 : ELECTRICAL TECHNOLOGY

1. BASIC CONCEPTS & UNITS:

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

2. ELECTROSTATICS:

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

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

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

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

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

BF5 : MECHANICS

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

2 STATICS OF PARTICLES CONCURRENT FORCES IN PLANE
Introduction, Resultant of Forces, Resolution and Components of Force, Resultant of Several Concurrent Forces, Equilibrium of a Partical, Equation of Equilibrium, Application of Statics of Particles, Summary.

3 STATICS OF PARTICLES CONCURRENT FORCES IN SPACE
Introduction, Components of Forces in Space, Resultant of Several Concurrent Forces, Equilibrium of a Particle in Space, Application of Statics of Particle, Summary.

4 STATICS OF RIGID BODIES___ NON – CONCURRENT FORCES IN PLANE
Introduction, Moment of Force about a Point, Varignon's Theorem, Moment of Couple, Resolution of a Given Force into a Force, Resultant of Coplanar Non-Concurrent System, Application of Statics of Rigid Bodies, Method of Minimum Potential Energy- Stable Equilibrium, Summary.

5 STATICS OF RIGID BODIES-NON-CONCURRENT FORCES IN SPACE
Introduction, Moment of Force about a Point, Moment of Force about a Given Axis, Couples in Space, Resolution of Force into Force and Couple, Resultant of Non-concurrent, Non-coplanar System, Equilibrium of Rigid Body in Three Dimensions, Summary.

6 FRICTION

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

7 CENTROID AND CENTRE OF GRAVITY

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

8 MOMENT OF INTERIA AND MASS MOMENT OF INTERIA

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

9 SIMPLE STRESSES AND STRAINS SSS-1

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

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

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

BF6 : INTRODUCTION TO MANUFACTURING PROCESSES

UNIT I :

1. MILLING MACHINES

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

2. THE LATHE

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

3. GRINDING MACHINE

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

4. BORING, BROACHING AND SAWING MACHINE

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

5. GEAR MANUFACTURING

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

6. METAL FINISHING PROCESS

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

7. PATTERN MAKING

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

8. MOULDING AND CORE MAKING

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

9. CASTING PROCESSES

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

10. WELDING

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

11. RECENT DEVELOPMENT IN MANUFACTURING PROCESS

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

UNIT 2 : (ONLY FOR BF6 STUDENTS)

12. FOUNDRY TOOLS AND EQUIPMENTS

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

13. HOT AND COLD WORKING PROCESS

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

14. POWDER METALLURGY

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

15. PLASTIC MANUFACTURING PROCESS

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

UNIT 3 : (ONLY FOR BSM5 STUDENTS)

1. Metal Cutting and Cutting Tools

2. Drilling Machines

3. Shaper, Planner and Slotting Machine

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

Course Structure

First Year

Second Semester

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

SYLLABUS

BF7 : MATHEMATICS - II

1. MATRICES

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

2. FINITE DIFFERENCE & DIFFERENCE EQUATION & NUMERICAL METHODS:

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

3. DIFFERENTIAL EQUATIONS:

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

Application of Differential Integrals: Physical applications of linear equations.

4. FUNCTIONS OF COMPLEX VARIABLE:

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

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

BF8 : APPLIED PHYSICS

UNIT – I

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

UNIT-II

A. Diffraction:

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

B. Ultrasonics:

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

C. Polarisation:

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

D. NUCLEAR PHYSICS

UNIT-III.

A.Wave Particle Quality:

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

B. Wave Equation:

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

UNIT-IV

A. Laser

B.Magnetism

UNIT-V

A. Semiconductor Physics:

B. Modern Physics:

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

BF9 : PROGRAMMING AND DATASTRUCTURE

1. **Introduction To Computers**: Introduction to Computers, its evolutions. First, second, third, fourth, fifth generation of computer. Basics of data, information, and data processing.

2. **Number System:** Number System , Representation of information , Positional Number System , Non positional number system, bit ,byte ,radix , floating point, The Binary Number Base Systems, Binary-Decimal, decimal–binary conversion. Octal, Hexa- Decimal Number system. Simple problems for conversion of Hexadecimal, Octal to other number system etc. Binary Coded Decimal, Extended Binary Coded Decimal Interchange Code ASCII notations –advantages disadvantages.

3. **Binary Arithmetic :**Binary Addition, Binary Subtraction, Multiplication, Division and their simple examples. Logic gates : AND ,OR ,NAND, NOR gates.

4. **Computer Software :** Software System- application Software and their Examples in real life. Operating System and their usage. Multitasking –Multiprogramming- Multiprocessing Operating System. An overview of WWW and its Software.
   Flow charts and simple problems on flow chart.

5. **Computer Hardware :**Hardware :Basic PC Components, Monitors, Keyboard, Storage devices :Hard Disk ; Storage related simple problems, CD, Mother-board, Printers its classification etc, OCR, OMR, BAR Code etc.
6. **Memory Hierarchies :** Main Memory ,Secondary Memory , RAM ROM , PROM, EPROM, EEPROM etc.

7. **Processing Unit :** CPU ;ALU, Components of CPU ; Register, Accumulator, IR, etc
   Concepts of vector Processing, Array Processing.

8. **Elements Of Programming Languages Fortran & C:**
   Introduction to programming logic , algorithm , simple types of real integer variables in FORTRAN and C. Mathematical representations of C and FORTRAN functions. Simple programs in C programming language.

BF10 : BASIC ELECTRONICS

1. **ELECTRONIC COMPONENTS**
   (1) Passive Components :-
      (i) Resistors :- Types, Rating, Colour Code, Tolerance, Fixed Value, Variable (Potentiometer), Thermistor, Negative & Positive temperature Coefficient, Basic Construction of Various types of Resistors.
      (ii) Capacitors :- Types (air, paper, ceramic, mica, electrolyte), Fixed Value & Variable, Rating , Basic Construction.
      (iii) Inductors :- Types, Inductors of high frequency application.
   (2) Active Components :-
      (i) Voltage & Current Source
      (ii) Ideal and Practical Voltage Source & Current Source, equivalent circuit, Conversion of Voltage Source into current source and vice-versa.

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

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

4. **P-N-P AND N-P-N TRANSISTORS**
   Base, Common Emitter and Common Collector (CB, CE, & CC) Configuration, Biasing of transistors, methods of Transistor Biasing, Base Resistor Method, Biasing with flb resistors,

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

5. **FIELD EFFECT TRANSISTOR (FET):-**
   Construction, Operation & characteristic of FET, FET as a switch, Typical application of FET, MOSFET-Working Principle of MOSFET.

6. **INTEGRATED CIRCUITS (IC'S):-**
   OP-AMP Characteristics, inverting & non-inverting OP-AMP, Differential Op-Amp's, Common Mode Rejection, application of OP-AMP (Adder, Substractor, Voltage follower, Integrator, Differentiator)

BF11 : ENGINEERING DRAWING AND GRAPHICS

1. **FUNDAMENTAL OF ENGINEERING DRAWING**:
   Introduction, Use of Different Drawing Instruments, Dimensioning, Scales, Geometrical constructions.

2. **ENGINEERING CURVES**:
   Introduction, Conic sections, Different methods of constructions of Cycloidal Curves, Cycloid , Epicycloid, Hypocycloid, Involute, Spiral , Helix.

3. **ORTHOGRAPHIC PROJECTIONS**:
   Introduction, First Angle Method of Projections, Third angle method of projections.

4. **ORHTOGRAPHIC SECTIONAL VIEWS:**
   Introduction, Full Screen , Sectional side view, Horizontal Section, Offset section, Ribs in section, cutting planes/section planes.

5. **ISOMETRIC PROJECTIONS**:
   Isometric projection and Isometric Axes, Isometric scale, None – Isometric Lines, Angles, Curves and Circles in Isometric.

6. **PROJECTIONS OF STRAIGHT LINES:**
   Introduction, Line parallel to two principle planes and perpendicular to the third , Line parallel to one principle plane and inclined to the other , oblique line, Traces of Lines.

7. **PROJECTION OF PLANES:**
   Types of planes, various positions of planes, Traces o f planes, planes parallel to one reference plane, planes perpendicular to one reference plane and inclined to the other oblique planes, projections on Auxiliary planes.

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

9. **SECTIONS OF SOLIDS**:
   Introduction , section plane, portion of solid assumed to be removed ,section, section lines, Apparent section, True shape of section, sectional view.

10. **DEVELOPMENT OF SURFACES:**
    Introduction, Application of Development of surfaces in Engineering products, method of Development concepts of points and lines, Development of prisms, Development of cylinder, Development of pyramid, Development of cone.

11. **FREE –HAND SKETCHES:**

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

BF 12 : ENVIRONMENTAL STUDIES

UNIT 1

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

UNIT 2

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

UNIT 3

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

UNIT 4

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

UNIT 5

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

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

In

Civil

Course Structure

Second Year

Third Semester

Paper Code	Subject
BSC1	Mathematics III
BSC2	Water and Waste Water Engineering
BSC3	Hydraulics
BSC4	Transportation Engg
BSC5	Surveying-I

Syllabus

BSC1 : MATHEMATICS III

1. PARTIAL DIFFERENTIATION AND PARTIAL DIFFERENTIAL EQUATION

Introduction, Limit , Partial derivatives , Partial derivatives of Higher orders, Which variable is to be treated as constant, Homogeneous function, Euler's Theorem on Homogeneous Functions, Introduction, Total Differential Coefficient, Important Deductions, Typical cases, Geometrical Interpretation of $\frac{dz}{dx}, \frac{dz}{dy}$, Tangent plane to a surface, Error determination, Jacobians, Properties of Jacobians, Jacobians of Implicit Functions, Partial Derivatives of Implicit Functions by Jacobian, Taylor's series, Conditions for F(x,y) to be of two variables maximum or minimum, Lagrange's method of undermined Multipliers.

2. PARTIAL DIFFERENTIAL EQUATIONS

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

3. FOURIER SERIES

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

4. LAPLACE TRANSFORMATION

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

5. NUMERICAL TECHNIQUES

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

6. NUMERICAL METHODS FOR SOLUTION OF PARTIAL DIFFERENTIAL EQUATION

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

BSC2 : WATER & WASTE WATER ENGINEERING

1. WATER SUPPLY ENGINEERING

Importance And Necessity Of Water Supply Schemes, Water Treatment, Importance And Reliability Of Water Works, Essentials Of Water Supply Engineering, Duties Of Water Works Engineers, Historical

2. QUANTITY OF WATER

General, Types Of Demands, Domestic Water Demand, Commercial And Industrial Demand, Fire Demand, Demands For Public Use, Compensate Losses Demand, Per Capita Demand, Design Period, Forecasting Population, Arithmetical Increase Method, Geometrical Increase Method, Incremental Increase Method, Decrease Rate Of Growth Method Or Decreasing Rate Method, Simple Graphical Method, Comparative Graphical Method, The Master Plan Method Or Zoning Method, Logistic Curve Method, The Apportionment Method, Fluctutaion In Demand Of Water, Factors Affecting The Water Demand

3. COLLECTION & CONVEYANCE

Intakes, Design Of Intakes, Types Of Intakes, Lake Intakes, River Intake, Reservoir Intake, Canal Intake, Conveyance Of Water, Open Channels, Aqueducts, Tunnels, Flumes, Pipes, Cast-Iron Pipes, Wrought Iron Pipes, Steel Pipes, Concrete Pipes, Cement-Lined Cast-Iron Pipe, Asbestos Cement Pipe, Copper And Lead Pipes, Wooden Pipes, Palstic Pipes, Vitrified Clay Pipes, Pipe-Joints, Spigot And Socket Joint, Expansion Joint, Flanged Joint, Mechanical Joints, Flexible Joint, Crewed Joint, Collar Joint, Joint For A.C Pipes, Laying Of Water Supply Pipes, Specifications For Laying And Jointiong Of Pipes, Hydrostatic Test, Disinfection Of Pipe Lines Before Use

4. WATER TREATMENT PROCESSES

General, Standards For Quality Of Treated Water, Objects Of Treatment, Considerations For Public Water Supply, Location Of Treatment Plants, Treatment Processes, Layout Of Treatment Plant, Labortory

5. DISTRIBUTION SYSTEM

General, distribution system, gravity system, pumping system, dual system, layout of distribution system, dead end or tree system, grid-iron system, circular or ring system, radial system, methods of supplying water, pressure in the distributin system, distribution reservoirs, capacity of the reservoirs, determination

of storage capacity, types of reservoirs, earth reservoirs, masonry and r.c.c. Reservoirs, elevated reservoirs, stand pipes, elevated tanks, accessories of reservoirs

6. SANITARY ENGINEERING

General, Definitions Of Some Common Terms, Used In Sanitary Engineering, Sanitary Works, Aims And Objects Of Sewage-Disposal

7. SYSTEMS OF SANITATION

General, Methods Of Collection, Conservancy System, Merits And Demerits Of Conservancy Systems, Merits And Demerits Of Water Carriage System, Sewerage System, Merits And Demerts Of Separate System, Merits And Demerits Of Combined System, Comparison Of Separate And Combined Suystems, Merits And Demerits Of Partially Separate System, Patterns Of Collection Systems

8. QUANTITY OF SANITARY SEWAGE

General, Sources Of Sanitary Sewage, Factors Affecting Sanitary Sewage, Additions Due To Infiltration, Subtractions Allowance, Rate Of Water Supply, Population, Type Of Area Served, Effect Of Growth Of Populaton, Determination Of Quantity Of Sanitary Sewage, Variation In The Quantity Of Sewage, Seasonal And Daily Variation, Peak Rates Of Flow, Minimum Flow

9. DRAINS AND SEWERS

Open Drains, Drain Sections, Classification Of Drains, Sewer, Sewer Sections, Sewer Materials, Brick Sewers, Vitrified Clays Or Stoneware Pipes, Cement Concrete Pipes, Asbestos Cement Pipes, Cast Iron Pipes, Steel Pipes, Plastic Pipes, Miscellaneous Materials Used For Sewer Construction, Sewer Joints, Bandage Joint, Spigot And Socket Joint, Collar Joint, Flush-Joint, Filled And Poured Type Joints, Method Of Making Poured-Joints With Sulphur And Sand, Method Of Making A Filled Joint, Other Types Of Joints, Corrosion Prevention In Sewers, Protective Barriers, Modification Of Materisls, Other Preventive Measures

10. SEWER APPURTENANCES

General, Manholes, Drop Manholes, Lamp-Holes, Street Inlets, Flushing Tanks, Catch Basins Or Pits, Sand, Grease And Oil Traps, Inverted Siphon, Storm Water Relief Works, Ventilation Of Sewers, Design Of Overflows And Regulators, Desing Of Inverted Sysphon, Float Actuated Gates And Valves, Flap Gates And Flood Gates, Measuring Devices

11. CHARACTERISTICS AND EXAMINATION OF SEWAGE

General, characteristics of sewage, physical characteristics, chemical characteristics, biological characteristics, decomposition of sewage, examination of sewage, sampling of sewage, sampling of sewage, physical examination, chemical examination, solids, procedure of determining total and volatile solids, dissolved oxygen determinaton, biochemical oxygen demand (b.o.d.), b.o.d. Test, b.o.d. Rates, chemical oxygen demand (c.o.d), stability and relative stability, chilorides and sulphides, method for determination of chlorides, chlorine demand, nitrogen, ph-value, grease, oil and fat, biological tests

12. SEWAGE TREATMENT PROCESSES

General, Object Of Treatment, Degree Of Treatment, Period Of Design, Effluent Disposal And Utilisation, Types Of Treatments, Location Of Treatment Plants, Treatment Processes, Sewage-Treatment Plants, Layout Of Treatment Plants, Points To Be Considered In Design, Laboratory

13. SCREENING AND SKIMMING

General, Purpose Of Screening, Types Of Screens, Bar-Screens, Fine Screens, Communiters, Other Types Of Screens, Design Factors, Disposal Of Screenings, Removal Of Oil, Grease Etc, Floatation, Skimming Tanks, Disposal Of Skimmings

14. SEDIMENTATION

General, Characteristics Of Settleable Solids, Theory Of Sewage Sedimentaiton, Classification Of Sedimentation Tanks, Design Of Sedimentation Tanks, Standard Design Loading, Detention Period, Settling Efficiency Of Particles, Sedimentation Tanks, Sludge Removal, Method Of Obtaining Uniform Flow In Sedimentation Tanks, Grit Chambers, Designe Of Grit Chambers, Disposal Of Grit, Detritus Tanks

15. BIOLOGICAL TREATMENT

General, Principle Of Biological Treatment, Classificaltion Of Sewage Filters, Intermittent Sand Filters, Contact Beds, Trickling Filters, Types Of Trickling Filters, Construction Features Of Trickling Filters, Trickling Filter Opertion And Loading, High Rate Filters, Design Of Trickling Filters, Galler And Gotaas Equation, Recirculation, Recirculation Factor, Biofilters, Humus Tanks, Comparison Of Low Rate And High Rate Trickling Filters, Filter Site Troubles And Remedies

16. QUALITY OF WATER

Wholesome Water, Impurities In Water, Examivation Of Water, Collection Of Water Samples, Water Analysis, Physical Tests, Chemical Tests, Living Organism In Water, Biological Tests, Standards Of Water Quality

17. CHEMICAL PRECIPITATOIN

General, Situations When Used, Chemical Used, Handling And Storing Of Coagulants, Dosage Of Coaculants, Determination Of Optimum Coagulant Dose, Feeding Devices, Mixing And Flocculation, Sedimentation, Clarifiers, Efficiency Of Chemical Precipitation

BSC3 : HYDRAULICS

1. **INTRODUCTION**
   Introduction, Classification of Fluid, Fundamental Units, S.I. (International System of Units), Presentation of Units and their Values, Rules for S.I. Units, Liquids and their properties, Density of Water, Specific weight of Water, Specific Gravity of Water, Compressibility of Water, Surface tension of water, Capillarity of Water, Viscosity of Water.

2. **HYDROSTATICS**
   Introduction, Total Pressure, Total Pressure on an Immersed Surface, Total Pressure on a Horizontally Immersed Surface, Total pressure on a Vertically Immersed Surface, Total Pressure on inclined surface, Centre of pressure, Pressure on a curved Surface.

3. **EQUILIBRIUM OF FLOATING BODIES**
   Introduction, Archimedes Principle, Buoyancy, Centre of Buoyancy, Metacentre, Metacentric Height, Analytical Method for Metacentric Height, Conditions of Equilibrium of a floating Body, Stable Equilibrium, Unstable Equilibrium, Unstable Equilibrium, Neutral Equilibrium, Maximum Length of Vertically Floating Body, Conical Buoys Floating in Liquid, Experimental method for Metacentric Height, Time of Rolling (Oscillation) of a floating body.

4. **BERNOULLI'S EQUATION AND ITS APPLICATIONS**
   Introduction, Energy of a liquid in Motion, Potential Energy of a liquid particle in Motion, Kinetic Energy of a liquid particle in Motion, Pressure Energy of a liquid particle in Motion, Total Energy of a liquid particle in Motion, Total Head of a liquid particle in Motion, Bernoulli's Equation, Euler's Equation for Motion, Limitations of Bernoulli's Equation, Practical Applications of Bernoulli's Equation, Venturimeter, Discharge through a Venturimeter, Inclined Venturimeter, Orifice Meter, Pitot Tube.

5. **FLOW THROUGH ORIFICES**

Introduction, Types of Orifices, Jet of Water, Vena Contracta, Hydraulic Coefficients, Coefficient of Velocity, Coefficient of Discharge, Coefficient of Resistance, Experimental Method for Hydraulic Coefficients, Discharge through a small Rectangular Orifice, Discharge through a large Rectangular Orifice, Discharge through a Submerged or Drowned Orifice, Discharge through a Wholly Drowned Orifice, Discharge through a Partially Drowned Orifice, Discharge through a Drowned Orifice under Pressure.

6. FLOW THROUGH MOUTHPIECES

Types of mouthpieces, Loss of a Head of a Liquid Flowing in a pipe, Loss of Head due to Sudden Enlargement, Loss of Head due to sudden contraction, Loss of Head at entrance to pipe, Discharge through a Mouthpiece, Discharge through an External mouthpiece, Discharge through an Internal mouthpiece (Re-entrant or Borda's mouthpiece), Discharge through a Convergent Mouthpiece, Discharge through a Convergent-divergent Mouthpiece (Bell-mouthpiece), Pressure in a mouthpiece, Pressure in an External mouthpiece, Pressure in an internal mouthpiece, Pressure in a Convergent Mouthpiece, Pressure in a Convergent-divergent Mouthpiece.

7. FLOW THROUGH SIMPLE PIPES

Introduction, Loss of Head in Pipes, Darcy's Formula for loss of Head in pipes, Chezy's Formula for Loss of Head in Pipes, Graphical Representation of Pressure Head and Velocity Head, Hydraulic Gradient Line, Total Energy Line, Transmission of Power through Pipes, Time of Emptying a Tank through a Long Pipe, Time of Flow from One Tank into Another through a Long Pipe.

8. UNIFORM FLOW THROUGH OPEN CHANNELS

Introduction, Chezy's Formula for Discharging through an Open Channel, Values of Chezy's Constant in the formula for Discharge through an Open Channel, Bazin's Formula for Discharge, Kutter's Formula for Discharge, Manning's Formula for Discharge, Discharge through a Circular Channel, Channels of Most Economical Cross-sections, Condition for Maximum Discharge through a Channel of Rectangular Section, Condition for Maximum Discharge through Channel of Trapezoidal Section, Condition for Maximum Velocity through a Channel of Circular Section, Condition for Maximum Discharge through a Channel of Circular Section, Measurement of River Discharge, Area of Flow, Simple Segments Method, Simpson's rule, Average Velocity of Flow, Floats, Pitot Tube, Chemical Method for the Discharge of a River.

9. VISCOUS FLOW

Viscosity, Newton's Law of Viscosity, Effect of Viscosity on Motion, Units of Viscosity, Effect of Temperature on the Viscosity, Kinematic Viscosity, Classification of Fluids, Ideal Fluid, Real Fluid, Newtonian Fluid, Non-Newtonian Fluid,Ideal Plastic fluid, Classification of Viscous Flows, Laminar Flow, Turbulent Flow, Reynold's Experiment of Viscous Flow, Reynold's number, Hagen-Poiseuille Law for Laminar Flow in Pipes, Distribution of Velocity of a Flowing Liquid over a Pipe Section, Loss of Head due to Friction in a Viscous Flow.

10. IMPACT OF JETS

Introduction, Force of Jet Impinging Normally on a fixed Plate, Force of Jet Impinging on an Inclined Fixed Plate, Force of Jet Impinging on a Curved Plate, Force of Jet Impinging on a Moving Plate, Force of Jet Impinging on a Series of Moving Vanes, Force of Jet Impinging on a Fixed Curved Vane, Force exerted ny a Jet of water on a series of vanes.

11. JET PROPULSION

Introduction, Pressure of Water due to Deviated Flow, Principle of Jet Propulsion, Conditions for maximum efficiency, Propulsion of Ships by water Jets, Propulsion of Ships Having Inlet Orifices at Right Angles to the Direction of its Motion (i.e. Orifices Amidship), Propulsion of Ships Having Inlet Orifices Facing the Direction of Flow.

12. WATER WHEELS

Introduction, Hydroelectric Power Plant, Heads of Turbine, Classification of Hydraulic Turbines, Water Wheels, Pelton

13. IMPULSE TURBINES

Introduction, Pelton Wheel, Runner and Buckets, Casing, Braking Jet, Work Done by an Impulse Turbine, Design of Pelton Wheels, Governing of an Impulse Turbine (Pelton Wheel), Other Impulse Turbines.

14. CENTRIFUGAL PUMPS

Introduction, Types of Pumps, Centrifugal Pump, Types of casings for the impeller of a Centrifugal Pump, Volute Casing (Spiral Casing), Vortex Casing, Volute Casing with Guide Blades, Work done by a Centrifugal Pump, Efficiencies of a Centrifugal Pump, Manometric Efficiency, Mechanical Efficiency.

15. PUMPING DEVICES

Introduction, Hydraulic Ram, Air Lift Pump, Rotary Pump.

16. HYDRAULIC SYSTEMS

Introduction, Hydraulic Press, Hydraulic Accumulator, Hydraulic Intensifier, Hydraulic Crane, Hydraulic Lift, Direct Acting Hydraulic Lift, Suspend Hydraulic Lift, Hydraulic Coupling, Hydraulic Torque Convertor.

BSC4 : TRANSPORTATION ENGINEERING

PART I

1. ROAD PLANNING:

Classification of Highways, Planning of a Highways, Fact Finding Surveys and Other Surveys, Reconnaissance, Preliminary Survey, Final Location Survey, Cross- section and Profiles, Surface Drainage Survey, Soil Investigation, Road Materials Investigation, Rights of Way Investigation, Bridge Sites, Survey Report, Annexure to the Survey Report, Phasing of Road Programme, Saturation System, Road Planning in India.

2. GEOMETRIC DESIGN OF HIGHWAY:

Introduction, Width of Formation, Right of Way, Width of Pavement, Camber, Gradient, Speed,Sight Distances, Curves and Their Radii, Road Cross –sections, Road- Rail Level Grossings.

3.LOW COST ROADS.

Introduction, Earth Roads, Kanker Roads, Garvel Roads, Traffic Bound Macadam, Water Bound Macadam Roads.

4.ROAD CONSTRUCTION MATERIALS:

Introduction, Crushed Rock Aggregate, Gravels , Sand , Slag, Requirements of a Good Road Aggregate, Aggregate Testing, Bituminous Materials, Specifications and Tests for Bituminous Materials , Cement Testing.

5. STABILISED ROADS.

Introduction, Stabilizers, Soil Stabilized Roads or Mechanical Stabilized Roads, Sand- Clay Roads, Gravel Surfaced Stabilized Roads, Soil- Lime-Pozzolen Stabilized Roads, Soil-Cement Stabilized Roads, Bitumen Stabilized Roads.

6. FLEXIBLE PAVEMENT:

Introduction, Type of Pavement, Structure of the Flexible Pavement, Group Index Method, California Bearing Ratio (C.B.R.) Method for the Design of Flexible Pavement.

7. BITUMINOUS ROADS.

Introduction, Types of Bituminous Pavements, Surface Treatment, Intermediate Type Surfaces, High-type Bitumen Pavement.

8.RIGID PAVEMENTS:

Introduction, Advantages of Cement Concrete Pavement, Disadvantages of Cement Concrete Pavement, Stressess in Cement Concrete Pavement, Concrete, Design of Concrete Pavement, The Sheets Formulas, The Westerguard Formulas, Picket's Equation, Kelly's Equation, Spanglar's Equation, Allowable Design Stress, Slab Thickness, Reinforcement in Concrete Slabs, Pavement Joints, Longitudinal Joints, Transverse Joints, Construction Equipment, Preparation of the Sub- grade and Sub-base, Forms, Concrete of Pavement.

9.DRAINAGE:
Introduction, Surface Drainage, Sub-Soil Drainage, Drainage of Marshy Soil, Bridges and Culverts, Causeways, Guidelines for the Design of Small Bridges and Culverts

10.TRAFFIC ENGINEERING:
Introduction, The Road Users and Their Characteristics, The Vehicles and Vehicular Characteristics, Road Characteristics, Traffic Census of Traffic Surveys, Traffic Volume Study, Cycle Variation in Traffic Volume, 30^{th} Highest Hourly Volume, Traffic Projection Factor, Origin and Destination Studies, Roadway Capacity , Road Parking and Studies, Parking Stalls , Parking Areas, Parking Lots and Parking Garages, Road Accidents and Studies , Traffic Regulation, Traffic –control Devices, Investigations, Clover-leaf, By- pass, Ribbon Development, Street and Highway Lighting.

PART II

11. HISTORY OF RAILWAYS IN INDIA:
Introduction, Development of Railways in India, Comparison of Roads and Railways ,Gauges.

12.ALIGNMENT SURVEY AND PROJECT REPORT:
Introduction, Track Alignment and Gradient, Survey for Track Alignment, Traffic Survey, Reconnaissance Survey, Preliminary Survey, Location Survey, Survey Dragings and Projects Reports.

13.PERMANENT WAY
Rails , Railway Sleepers, Ballast, Rail Fastenings and Fixtures.

14.RAILWAY POINTS AND CROSSINGS AND JUNCTIONS:
Introduction, Turnouts, Switches , Crossing, Design of Turnout , Types of Track Junctions, Design of Simple Junctions.

15.RAILWAY TRACK DRAINAGE:
Introduction, Importance of Drainage, Requirement of Drainage System, Drainage systems, Cross Drainage, Drainage Problems.

16.MAINTENANCE OF RAILWAY TRACK:
Introduction, Advantages of Good Maintenance, Daily Maintenance , Periodical Maintenance, Modern Railway Track, Maintenance of Track Alignment, Maintenance of Drainage, Maintenance of Track Components, Maintenance of Points and Crossings, Maintenance of Level Crossing , Maintenance Organization, Track Recording , Mechanical Maintenance, Mechanized Maintenance, Measured Shovel Packing, Directed Maintenance of Track, Inspection of Track- Track Recording and Track Tolerances

17.RAILWAY STATION YARDS AND EQUIPMENT:
Introduction, Site Selection, Types of Selections, Station Yard, Requirements and Amenities of a Railway Station, Level Crossing, Types of Equipment, Platform, Water Column, Triangle, Ashpit, Ashpan, Turntable, Buffer Stop, Catch Siding or Slip Siding, Scotch Block, Derailing Switch, Sand Hump, Fouling Marks, Cow Catcher, Weigh Bridge, Loading Gauges, End- Loading Ramp, Traverser, Cranes, Engine Shed.

PART III

18.INTRODUCTION:
General, Advantage of Tunnelling, Economics of Tunnelling.

19.TUNNEL SURVEYING:
Introduction , Initial Surveys, Setting Out of the Tunnel Centre- line on the Surface, Triangulations, Setting Out Inside Tunnels, Settings Out Steeply Inclined Tunnels, Transferring of Alignment Through Shafts, Curves, Adjustments at Meeting Points of Tunnels.

20.DESIGN OF TUNNELS:
Introduction, Rail-road Tunnels , Vehicular Tunnels, Rapid Transit Tunnel.

21.METHOD OF TUNNELING IN SOFT STRATA:

Introduction, Tunnelling in Firm Ground, Tunnelling in Soft Ground, Tunnelling in Running Ground, Shield Method of Tunnelling , Method of Supporting Roof and Sides in Multiple Drift Method.

22.METHOD OF TUNNELLING IN ROCK:
Introduction, Tunnelling Method, Sequence of Operation for Construction of Tunnel in Rocky Strata, Drilling, Blasting, Inspection and Handling Misfires.

23.SAFETY PRECAUTION IN TUNNELLING WORK:
Introduction, Safety Programme, Medical and Other Facilities, Electrical Installation and Lighting, Underground Excavation, Ventilation, Scaling and Mucking.

24.TUNNEL SHAFTS AND CAISSONS:
Introduction, Timber Shafts, Rock Shaft, Steel Lining for Shaft, Shaft by Caissons, Drop Shafts, Freezing Process for Shafts.

25.TUNNEL LINING:
Objects of Linings, Materials for Tunnel Linings,Design of Tunnel Linnings, Concrete Linings.

26.TUNNEL VENTILATION , DUST PREVENTION AND LIGHTING:
Object of Ventilation, Natural Ventilation, Mechnical Ventilation Methods, Ducts, Ventilation Shafts, Fans, Ventilation Buildings, Dust Control, Lighting, Mucking,

27.DESIGN OF TUNNELS CONVEYING WATER:
General, Design of Tunnels Conveying Water: Hydraulic Design, Design of Tunnel Supports.

BSC5 : SURVEYING - I

1. LEVELLING
Definitions of important terms in leveling, Instruments - Level Surface, Level Surface, Level line, Horizontal plane, Horizontal line, Vertical plane, Datum surface, Elevation of a point, Line of collimation, Axis of telescope, Axis of bubble tube, Vertical axis, Back sight, Fore sight, Intermediate sight, Change point, Height of instrument, Station point, Bench mark, Instruments – Level, Dumpy level, Wye level, Cooke's reversible level, Cushing's level, Tilting level. General features of levels, Levelling staff, Taking staff readings, Level tube, Sensitiveness, Testing and adjustment of levels, Temporary adjustments of level - Setting up of the instrument, Levelling the instrument, Elimination of parallax. Permanent adjustments of levels – Adjustment Precautions in leveling, Level field book, Simple Levelling, Series of differential leveling, Booking and reducing of levels, Plane of collimation method, Rise and fall method, Comparative merits of the methods of reduction, Specimen pages of a level field book, Field work in leveling, Differential leveling, Check leveling, Running of sections, Longitudinal section, Checking the levelling work, Profile Leveling, Profiles, Plotting the profile, Working profile, Cross Sections, Cross-sectioning by level and staff, Cross-sectioning by theodolite, Giving levels for construction at works, Curvature and refraction, Error due to curvature, Error due to refraction, Reciprocal leveling, Reciprocal Levelling. adjustments of level circuits, Principle Of Reversion, Precision Of Differential Leveling, Hand Signals, Adjustment Of Dumpy Levels.

2. THEODOLITE SURVEYING
Measuring angles and directions, Introduction, setting up the theodolite - Cross Hairs, Transit theodolite, Levelling head, Limb or lower plate, Spindles, Upper plate, Standards of A-frames, Level tube, Compass, Telescope, Vertical circle, T-frame or index bar, Plumb-bob, Tripod, Types of compasses, Circular box compass, Trough compass, Tubular compass, care of the transit, reading transit verniers, *styles of graduations,* pointing the instrument, measurement of horizontal angles, closing the horizon, Conditions of perfect adjustments, Optics, Conjugate foci, Spherical aberration, Chromatic aberration, Types of surveying telescopes, Main parts of a telescope – Body, Objective, Eye piece, Erecting eye piece, Diagonal eye piece, Diaphragm, Parallax, Qualities of a telescope, Brightness or illumination of the image, Definition, Magnification, Size of field, Level tube, Sensitiveness of a bubble tube, Levelling up, Elimination of parallax, Measurements of angles, Inaccurate leveling, Using wrong tangent screws, Displacement or slip, Incorrect bisection of the observed points, Reading The Theodolite, measuring with a direction theodolite, Vernier reading, Measurement of horizontal angle by repetition, measuring angles by repetition, laying off an angle by repetition, Measurement of horizontal angle by reiteration, Measurement of horizontal angles by deflection angles, Measurement of horizontal angles by direct angles, Third method for prolongation of a straight line, Lining-in, BALANCINE –

IN, Random line method for balancing-in, Laying horizontal angle by method of repetition, Locating point of intersection of two straight lines, Traversing or traverse survey by theodolite, Closed traverse survey by theodolite, Open or unclosed traverse survey be theodolite, Methods of traversing by theodolite, Traversing by direct observation of angles, Traversing by deflection angles, Traversing by direct observation of bearings, Linear measurements, Checks in unclosed traverse, Traversing by deflection angles, Traversing by direct observation of bearings of the survey lines, Traversing by direct angles, Direct method in which the telescope is transited, Comparison of all the three fast needle methods, Comparison of fast needle method with included angles method of traversing, Checks in closed traverse, Travversing by included angles, Balancing the traverse, Field problem, Equipment, Work and procedure, Traverse computations, Area of closed traverse from latitudes and double meridian distances (DMD), Permanent adjustments of a transit theodolite, Adjustments of the plate levels, Adjustment of line of sight, *Necessity,Test,* Adjustment of telescope level, Adjustment of the vertical index frame, General comments on adjustments, Adjustment of wye theodolite, Adjustment of plate level, Adjustment of line of collimation, Adjustment of horizontal axis, Adjustment of telescope level, Adjustment of index error, Tavistock Theodolite, Ideal requirements of a theodolite, Errors in non- adjustable parts of a theodolite and their elimination, Stability, Other sources of errors in theodolite work, Observational errors, Errors of manipulation, Natural errors, Circular movement of the theodolite, *Elimination of errors,* Eccentricity of verniers, Eccentricity of the horizontal circle, Errors of graduation, Errors of perpendicularity of planes of the circle to their respective axes, Error in desirable relationship between resolution and vernier least count, Error in desirable relationship between resolving power and sensitivity levels, Error in coincidence of the inner and outer axes of rotation, Omitted or missing measurements,

3. PLANE TABLE SURVEYING

Drawing board- Alidade , Accessories, Spirit level, Trough compass or circular box compass, U-frame or plumbing fork, Waterproof cover, Paper, Advantages of plane table survey, Disadvantages of plane table survey, Points to be borne in mind for plane tabling,, Setting up of the table, Levelling, Orientation, Orientation by back sighting, Orientation by magnetic needle, Centring, Testing and adjustments of plane table- Board, Methods of plane table survey, Radiation method of plane tabling, Intersection or triangulation method of plane tabling, Traversing method of plane tabling, Resection method of plane tabling, Three-point problem, Selection of station point S, Solution of three point problem method by trial and error method, Solution of three-point problem by Lehman's rules, Solution of three-point problem by mechanical method, Solution of three-point problem by graphical method, Bessel's method, Two-point problem, Errors in plane tabling, Instrumental errors, Errors of manipulation and sighting, Errors of plotting, Contouring by plane table, Slotted templates, Analytical methods,

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

In

Civil

Course Structure

Second Year

Fourth Semester

Paper Code	Subject
BSC6	Society, Environment, Engineering
BSC7	Building Construction
BSC8	Structural Analysis
BSC9	Advanced Surveying
BSC10	Solid Mechanics

Syllabus

BSC6 : SOCIETY, ENVIRONMENT & ENGINEERING

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

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

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

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

4.SOCIAL CHANGE

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

5.SOCIAL CONTROL:

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

6. SOCIAL PROBLEMS:

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

7. CULTURE:

What culture is ? , characteristics of culture. Concept connected with culture characteristics of lag, causes of culture lag , civilization .
Difference between culture and civilization .Acquired behaviour, culture Diffusion.

8. CAPITALISM , MARXISM AND SOCIALISM:

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

9.SOCIALOGY AND TECHNICAL CHANGES:

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

10. HISTORICAL PERSPECTIVE:

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

11.TECHNOLOGY ASSESSMENT AND TRANSFER:

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

12.CYBERNETICS:

Introduction, what cybernetics is ? control system

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

14.INFLATION AND POVERTY:
Inflation, causes of Inflation in India, measures to control inflation and deflation; poverty, Industrialisation of country; conclusion.

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

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

17. PERSONAL MANAGEMENT:
Defination of personnel management, importance of personnel management,principle of personnel management objectives of personnel management functions of personnel management , Recruitment and selection of employees. Manpower planning ; objectives of manpower planning , Types of manpower planning , steps in manpower planning , Procedure of appointing an employee in a factory , Training and Development, principles of Training ,methods of Training , Industrial safety , Accident Human causes, Effect of accidents, Effect to the Industry , Effect on worker, cost of society, Types of Accidents , Safety procedures.
Ways to prevent or minimize Accidents , Accident reporting and Investigation, Investigation of causes Precautionary measures for maintaining . Industrial Health, Incentives premium OR Incentive Bonus system, Essential s of a Good Incentive systems, Understanding duties of other officials in Department. Duties of Maintenance Engineer. Duties of safety officer, Duties of Security officer.

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

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

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

BSC7 : BUILDING CONSTRUCTION

1. FOUNDATION

General Discussion, Assessment Of Allowable Soil Pressure, Settlement In Clay, Settlement In Sand, Differential Settlement, Types Of Foundations, Deep Foundations, Pile Foundations, Well Foundations And Caissons, Foundations In Special Conditions
Foundation Failures, Durability Of Foundation, Excavations For Foundation Trenches And Basements, Dewatering Of Foundation Excavations, General Procedure In Foundation Design, Cofferdams, Circular Cellular Cofferdam.

2. ACOUSTICS AND SOUND INSULATION

General Discussion And Scope Of Study, Acoustics Of Buildings, Sound Insulation Of Buildings, Characteristics Of Audible Sound, Rating Of Intensity Levels Of Sound Or Noises (In Decibels Or Db), Behaviour Of Sound And Its Effects (Or Principles Of Acoustics), Absorption Coefficients For Important Surfaces, Acoustical Defects, General Remarks On Reverberatlon Time And Audience Factor, Acoustics Of Buildings, Sound Absorbents Or Acoustical Materials, Sound Insulation Of Buildings, Transmission Of Noise, Sound Insulation Vs. Sound Absorption, Transmission Loss, Maximum Acceptable Noise Levels

3. VENTILATION, AIR-CONDITIONING AND THERMAL INSULATION

General Remarks, Ventilation, Definitions And Necessity Of Ventilation, Functional Requirements Of A Ventilation System, Systems Of Ventilation And Their Choice, General Considerations And Rules For Natural Ventilation Air-Conditioning Of Buildings, General-Purposes And Classification, Principles Of Comfort Air-Conditioning, Comfort Air-Conditioning Under Indian Conditions, Systems Of Air –Conditioning, Essentials Of An Air-Conditioned System, Air Pumps, Thermal Insulation Of Buildings (Or Heat Insulation Of Buildings), General Discussion And Definitions Of Terms, General Principles Of Thermal Insulation, Heat Insulating Materials Or Material, Of Heat Insulation, Values Of Density, Thermal Conductivity And Thermal Resistivity Of Some Building And Insulating Materials,
Methods Of Heat Insulation Or Thermal Insulation

4. STRUCTURAL STEEL WORK

General Principles Of Steel Work, Rolled Steel Sections Or Sections In Steel Work, Methods Of Connecting Steel-Work, Structural Steel Members And Their Interconnection, Important Considerations In Fire Protection, Properties Of Fire-Resisting Materials, Fire-Resistant Construction, General Measures Of Fire Safety In Buildings

5. MISCELLANEOUS STRUCTURES

General, Shell Structures, Folded Plate Structures, Skeletal Space-Frame Structures, Pneumatic Structures, Grain Storage Structures, Prefabricated Structures, Fireplaces And Flues, R.C.C. Chimneys, Earthquake-Resistant Structures, Modified Mercalli Intensity Scale (Abridged)

6. CONSTRUCTION MANAGEMENT, CONTROL AND VALUATION OF A BUILDING

Introduction, Objects Of Planning, Construction Stages, Construction Operation, Construction Schedules, Bar Chart, Milestone Chart, Definitions, Pert Network, Cpm Network, Explanation Of Table, Cost Analysis, Value Engineering Manpower And Materials Requirements In Buildings, Job Layout For Building, Project Supervision, Project Control During Construction, Construction Contracts, Management Techniques For Rural Housing Development In India, Demolition Works In Buildings, Building Disaster Management, Environmental Impact Management

BSC8 : STRUCTURAL ANALYSIS

1. SHEAR FORCES AND BENDING MOMENT

Beam, Types of Loads, Types of Supports, Shear Force and Bending Moment, Sign Convention, Shear Force and Bending Moment Diagrams, S.F. and B. M. Diagrams for Simply Supported Beams, S. F. and B.M. Diagrams for Overhanging Beams, Relationship between Rate of Loading, Shear Force and Bending Moment, Graphical Method of Plotting S. F. and B. M. Diagrams, Uniformly Distributed Loads

2.DEFLECTION OF BEAMS

Introduction, Relationship between Curvature, Slope and Deflection, deflection Curves, Macaulay's Method, Deflection Curve by Macaulay's Method, Propped Cantilevers, Deflections by Moment Area Method, Sign Convention, Slope and Deflection for Cantilever, Slope and Deflection for simply Supported Beam, Deflections by Conjugate Beam Method, Deflection by strain Energy, Impact Loading on Beams, Laminated Spring, Deflection Due to Shear

3. FIXED AND CONTINUOUS BEAMS

Introduction, Fixing Moments for a Fixed Beam of Uniform Section, Effect of Sinking of Support, Effect of Rotation of a Support, Slope and Deflection at a point, by Moment Area Method, Introduction, Analysis of Continuous Beams, Reactions at the supports, Effect of Sinking of Supports

4. COLUMNS AND STRUTS

Introduction, Euler Crippling Load-Column with One End Free and the Other End Fixed, Column with both ends fixed, Column with One End Fixed and the other Hinged, Limitation of Euler's Formula, Column with Initial Curvature, Column Carrying Eccentric Load, Laterally Loaded Columns, Empirical Formulae

5. RIVETED CONNECTIONS

Introduction, Riveted Connections, Types of Riveted Joints, Failure of Riveted Joints, Strength of Riveted Joints, Permissible Stresses in Rivets, Design of Riveted Joints, Riveted Joints in Cylindrical and Spherical Shells, Structural Connections, Riveted Joints Subjected to Moment Acting in the Plane of the Joint, Riveted Joint Subjected to Moment Acting at Right Angles to the Plane of the Joint

6.WELDED CONNECTIONS

The welding process, types of welds, intermittent fillet welds, combined stresses in weld, eccentric welded connection

BSC9 : ADVANCED SURVEYING

1. TRIGONOMETRICAL LEVELLING

Introduction, Heights And Distances, Base Of The Object Acessible, Base Of The Object Inaccessible: Instrument Stations Not In The Same Vertical Plane As The Elevated Object, Geodetical Observations, Axis Signal Correction (Eye And Object Correction), Determination Of Difference In Elevation,

2. TRIANGULATION

Geodetic Surveying, Classification Of Triangulation System, Triangulation Figures Or Systems, The Strength Of Figure, Routine Of Triangulation Survey, Signals And Towers Towers, Non-Luminous Or Opaque Signals, Base Line Measurement, Calculations Of Length Of Base, Measurement Of Horizontal Angles, Satellite Station: Reduction To Centre, Extension Of Base: Base Net.

3. TOPOGRAPHIC SURVEYING

Introduction, Methods Of Representing Relief, Contours And Contour Interval, Characteristics Of Contours, Procedure In Topographic Surveying, Methods Of Locating Contours, Interpolation Of Contours

4. ROUTE SURVEYING

Introduction, Reconnaissance Survey, Preliminary Survey, Location Survey, Construction Survey.

BSC10 : SOLID MECHANICS

1. **ANALYSIS OF STRESS**
   Introduction, stress, complementary shear stress, simple shear, the state of pure shear, principal stresses and principal planes, sign convention, Mohr's circle for biaxial stresses, Mohr's circle.

2. **ANALYSIS OF STRAIN**
   Introduction, Strain On An Oblique Plane, Mohr's Circle Of Strain, Compatibility Equations

3. **STRESS – STRAIN RELATIONS FOR LINEARLY ELASTIC SOLIDS**
   Introduction, Hooke's Law, Poisson's Ratio, Differential Equation Of Equilibrium, The Stress Function-Plane Stress

4. **THEORY OF FAILURE**
   Introduction, Maximum Principal Stress Theory, Maximum Shearing Stress Theory, Maximum Strain Theory, Significance Of Theories Of Failure, Factor Of Safety

5. **ELASTIC STABILITY**
   Introduction, Failure Of A Column Or Strut , Euler's Column Theory , A Sign Conventions , Limitation Of Euler's Formula , Empirical Formula For Columns, Rankine's Formula For Columns, Euler's Formula

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

In

Civil Engineering

Course Structure

Third Year

Fifth Semester

Paper Code	Subject
BTC1	Design of RC Structures
BTC2	Foundation Engineering.
BTC3	River Engineering
BTC4	Hydropower Engineering
BTC5	Operation Research

BTC1 : DESIGN OF R.C. STRUCTURES

1. DESIGN PHILOSOPHIES
Introduction, Working Stress Method, Ultimate Load Method, Limit State Method, Limit State Method Vs Working Stress Method, Building Code, Accuracy Of Computations, Type Of Construction

2. SINGLY REINFORCED STRUCTURE
Introduction, Bending Of Beams, Cracked Concrete Stage, Ultimate Strength Stage, Assumptions, Moment Of Resistance, Modes Of Failure, Minimum And Maximum Tension Reinforcement, Effective Span

3. DOUBLY REINFORCED SECTIONS
Introduction, Types Of Problem, Stress In Compression Reinforcement, Design Steps, Minimum And Maximum Reinforcement, Design Tables, Flanged Beams, Effective Width Of Flange

4. SHEAR AND DEVELOPMENT LENGTH
Introduction, Shear Stress, Diagonal Tension, Shear Reinforcement,Spacing Of Shear Reinforcement, Development Length, Anchorage Bond, Flexural Bond

5. TORSION
Introduction, torsional stiffness of homogeneous sections, torsional stiffness of r. C. Sections, torsional reinforcement, distribution of torsion reinforcement, torsion in beams curved in plan

6. TYPES OF FLOOR
Introduction, One-Way Slab Systems, Two-Way Slab Systems, Flat Slab Systems, Flat Plate Systems, Grids.

7. COLUMNS AND WALLS
Introduction, effective height of a column, assumptions, minimum eccentricity, short column under axial compression, requirements for reinforcement, columns with helical reinforcement, short columns under axial load and uniaxial bending, construction of design charts, short columns under axial load and biaxial bending, slender columns, walls, construction of design charts, reinforcement in walls, corbels, truss analogy, detailing of reinforcement.

8. TYPES OF STAIRS
Introduction, common types of stairs, central-wall type stairs, central-column type stairs, slabless stairs, helicoidal stairs, free-standing stairs

9. RETAINING OF WALLS
Intorduction, forces on retaining walls, stability requirements, proportioning of cantilever walls, development length, loads on the heel, rear counterforts,

10. DESIGN OF TANKS
Roofs, ring beam, floors, walls of rectangular tanks, walls of circular tanks, shear force, steel ladder, base slab, cover to reinforcement , joints, design and detailing of joints, spacing of joints ,

11. MASONARY BUILDINGS
Introduction, Brick Wall Design Uner Vertical Loads

12. FOUNDATIONS
Introduction, minimum foundation depth., shallow foundations, use of plinth beams, brick wall design under horizontal loads, resistance to earthquake forces by wall boxed in plan, deep foundations

BTC 2 : FOUNDATION ENGG

1 INTRODUCTION
Soil as a three phase system, water content, density and unit weights, specific gravity, voids ratio, porosity and degree of saturation, density index

CLASSIFICATION OF SOILS
General, compaction, standard proctor test, equivalent for standard proctor test. [is *: 2720 a* (part vii) : 1965 : light compaction], water-density relationship, modified proctor test, modified proctor test curve, jodhpur mini-compactor test, typical comparison of the standard proctor test and jodhpur mini-compactor test, jodhpur mini-compactor, field compaction methods, field compaction control, proctor needle, calibration curve, factors affecting compaction, effect of compactive effort on compaction, obtained by the jodhpur mini-compactor, shear strength

3 STRESS DISTRIBUTION
Introduction, concentrated force: boussinesq equations, concentrated load: boussinesq, analysis, pressure distribution diagrams, variation of σ z with r at constant depth, vertical stress distribution on a horizontal plane (influence diagram for σz at a), σz distribution on vertical lane, vertical pressure under a uniformly, uniformly distributed load over circular area, vertical pressure due to a line load, vertical pressure under strip load, vertical. Pressure under centre of strip load, vertical pressure under a uniformly loaded rectangular area, rectangular loaded area, influence factor for rectangular area (after steinbrenner), equivalent point load method, newmark's influence chart, radii of concentric circles for influence chart, contact pressure,

4 SURFACE TENSION CAPILLARITY & EFFECTIVE STRESS
Modes of occurrence of water in soil, adsorbed water, adsorbed water and pore water (lambe, 1953), capillary water, surface tension and formation of meniscus, capillary rise, values of unit weight, dynamic viscosity and surface tension for water, capillary heights of soil, stress conditions in soil : effective and neutral pressures, capillary siphoning,

5 PERMEABILITY
Introduction, darcy's law, discharge velocity and seepage velocity, validity of darcy's law, factors affecting permeability, constant head permeability test, falling head , permeability test, permeability of stratified soil deposits,

6 SEEPAGE ANALYSIS
Head gradient and potential, seepage pressure, upward flow : quick condition
Sand condition, two dimensional flow: laplace equation, seepage through anisotropic soil, phreatic line of an earth dam , one dimensionalconsolidation, consolidation of laterally confined soil, semi log plot of pressure voids ratio relationship, consolidation of undisturbed specimen, terzaghi's theory of one dimensional consolidation, calculation of voids ratio and coefficient of volume change, calculation of voids ration by height of solids method, calculation of voids ratio by change in voids ratio method,

determination of coefficient of consolidation, shear strength, theoretical considerations : mohr's stress circle, mohr-coulomb failure theory, the effective stress principle, measurement of shear strength, direct shear test, triaxial compression test, vane shear test , shear strength of cohesive soils

7 EARTH PRESSURE

Introduction , plastic equilibrium in soils : active and pasive states, active and passive states of plastic equilibrium, active earth pressure: rankine's throry, backfill with uniform surcharge, active earth pressure of cohesive soils, passive earth pressure : rankine's theory, coulomb's wedge theory

8 DESIGN OF GRAVITY RELATING WALL

Design of gravity relating wall

9 STABILITY OF SLOPES

Introduction, stability analysis of infinite slopes, stability analysis of finite slopes, the swedish slip circle method, stability of slopes of earth dam

10 SUBSOIL EXPLORATION

Introduction, site reconnaissance, site exploration, methods of site exploration, soil samples and samplers, disturbed sampling, undisturbed sampling, penetration and sounding tests, geophysical methods

11 SHALLOW FOUNDATION:

Types of foundations, spread footing, safe bearing pressure, settlement of footings, combined footing and strap footing, mat or raft footing, i.s. Code of practice for design of raft foundations, modulus of subgrade reaction K_s

12 WELL FOUNDATION

Introduction: caissons, shapes of wells and component parts, depth of well foundation and bearing capacity, forces acting on a well foundation, analysis of well foundation,
Heavy wells

BTC3 : RIVER ENGINEERING

1. RUN OFF

Introduction, Hydrograph, Runoff Characteristics Of Streams, Yield (Annual Runoff Volume), Flow-Duration Curve, Flow-Mass Curve, Sequent Peak Algorithm, Droughts, Surface Wter Resources Of India

2. STREAM FLOW MEASUREMENT

Introduction, Measurment Of Stage , Mesurement Of Velocity, Dilution Technique Of Streamflow Measurement, Electromagnetic Method, Ultrasonic Method, Stage-Discharge Relationship, Extrapolation Of Rating Curve, Hydrometry Stations

3. FLOODS

Introduction, Rational Method, Empirical Formulae, Unit Hydrograph Method, Flood-Frequency Studies, Gumbel's Method, Log-Pearson Type Iii Distribution, Partial Duration Series, Regional Flood Frequency Analysis, Limiations Of Frequency Studies, Design Flood, Design Storm, Risk, Reliability And Safty Factor

4. FLOOD ROUTING

Introduction, Basic Equations, Hydrologic Storage Routing, Attenation, Hydrologic Channel Routing, Hydraulic Method Of Flood Routing, Routing In Conceptual Hydrograph Devlopment , Clark's Method For Iuh, Nash's Conceptual Model, Flood Control, Flood Forecasting, Flood Control In India

BTC 4 : HYDROPOWER ENGINEERING

1. WATER POWER DEVELOPMENT

Definition, the hydrologic cycle, hydrograph, flow duration curve, mass curve, hydropower plant, hydroplant controls, combined hydro and steam power plants .

2. HYDRAULIC MACHINES

Introduction, turbines, general layout of a hydro-electric powerplant, definitions of heads and efficiencies of turbines, classification of hydraulic turbines, pelton wheel (or turbine), radial flow reaction turbines, velocity triangles and work done by water on runner, outward radial flow reaction turbine, Francis turbine, design of Francis turbine runner, design of Francis turbine runner, deriaz turbine, scale effect

Performance characteristics of hydraulic turbines, constant efficiency or iso-efficiency or muschel curves, Governing of reaction turbines, cavitations, selection of hydraulic turbines, surge tanks.

3. CENTRIFUGAL PUMPS

Introduction, classification of pumps, water hammer in pipes

BTC 5 : OPERATIONS RESEARCH

1. CLASSIFICATION OF O.R. MODELS

Physical Models, Symbolic Models, Advantages Of A Model, Limitations Of The Model, Scope Of Operations Research In Management

2. LINEAR PROGRAMMING FORMULATION & GRAPHICAL METHOD

Introduction, Basic Requirements, Basic Assumptions, Advantages Of Linear Programming, Limitations Of Linear Programming, Application Areas Of Linear Programming, Formulation Of Linear Programming Models

3. TRANSPORTATION

Example, Agriculture, General Mathematical Formulation Of Linear Programming Problem, Definitions

4. SOME SPECIAL CASES

Multiple Optimal Solutions, Infeasible Solution, Contradictory Constraints, Unbounded Solution

5. LINEAR PROGRAMMING

The Simplex Method, Introduction, Standard Form Of Linear Programming Problem, Slack And Surplus Variables, Slack Variable

6. STEPS OF THE SIMPLEX METHOD

Steps of the Simplex Method (Maximization Case), Flow Chart of the Simplex Method, Simplex Method (Minimization Case), Steps of the Simplex Method (Minimization Case), Maximization Case (Constraints of Mixed Type), Resolution of Degeneracy

7. LINEAR PROGRAMMING, DUALITY

Introduction, Formulation Of Dual Problem, Interpreting Primal-Dual Optimal Solutions, Solving The Primal-Dual Problem**,** Dual Of A Primal With Mixed Constraints, Important Primal-Dual Results, Advantages Of Duality, The Dual Simplex Method

8. TRANSPORTATION PROBLEM

Methods For Finding Initial Solution, North-West Corner Method (NWCM), Least Cost Method (LCM), Vogel's Approximation Method (VAM), Stepping-Stone Method, The Dual of Transportation Problem, Alternative Optimal Solutions, Unbalanced Transportation Problems, Supply Exceeds Demand, Demand Exceeds Supply, Degeneracy in the Transportation Problem, Prohibited Routes, Profit Maximization in a Transportation Problem, Trans-shipment Problem, Time-Cost Trade-of in the Transportation problem

9. HUNGARIAN METHOD OF ASSIGNMENT PROBLEM

Minimization Case, Variations Of The Assignment Problem, An Application--Airline Crew Assignment, Travelling Salesman Problem

10. NETWORK MODELS : PERT & CPM

Objectives of network analysis, Application of network models, Advantages of network models, Project network, Difference between PERT and CPM, Activities, Events, Estimating Activity Times, Effect of Introducing a Dummy Activity in a Network, Probability Statements or Project Duration, Probability of completing the project on or before a specified time, PERT algorithm

11. FLOAT OF AN ACTIVITY

Introduction, Optimization of Project Time and Cost in a PERT Network, Limitations of PERT/CPM

12. QUEUING MODELS

Basic Components of the Queuing System, Input Source, Queue Discipline, Service Mechanism,

Classification of Queuing Systems, Characteristics of Model I**,** II, III

13. INVENTORY CONTROL MODELS

Principal Categories of Inventories and Their Functions, Structure of Inventory Management System, The Basic Deterministic Inventory models, Multiple Item Deterministic Models, Limitation set up by capital restriction, Aggregate resource limitations, Selective Inventory Control, Application of ABC analysis, Inventory Control Systems, Reorder level, Probabilistic Models

14. SYSTEM TERMINOLOGY

System and Simulation models, Random Variable and Random Numbers, Monte-Carlo Simulation, Generation of Random Numbers, Simulation and Inventory Control, Simulation and Queuing System, Simulation and Capital Budgeting , Limitations of Simulation, Simulation Languages, Simulation Applications

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

In

Civil

Course Structure

Third Year

Sixth Semester

Paper Code	Subject
BTC6	Design of Steel Structures
BTC7	Advanced Structural Analysis
BTC8	Environmental Engineering
BTC9	Advanced Foundation Engineering
BTC10	Industrial Economics & Management

BTC 6 : DESIGN OF STEEL STRUCTURES:

1. **General Construction**

   Introduction, Advantages of steel as a structural material, Disadvantages of steel as a structural material, Structural steel, Stress-strain curve for mild steel, Rolled steel sections, Loads, Permissible stresses, Working stresses, Factor of safety, Minimum thickness of structural members, Design methods.

2. **Structural Fasteners**
   Riveting, Bolted joints, Types of riveted and bolted joints, Definition, Failure of a riveted joint, Strength of riveted/bolted joint, Assumptions in the theory of riveted joints, Efficiency of a joint, Design of riveted joints for axially loaded members, Welded joints, Advantages of welded joints, Disadvantages of welded joints, Types of welds and their symbols, Design of fillet welds, Design of butt weld, Design of plug and slot welds.

3. **Compression Members**
   Introduction, Effective length, Slenderness ratio, Column design formula, Types of sections, Assumptions, Design of axially loaded compression members, Built-up columns (latticed columns), Lacing, Batten, Compression members composed of two components back-t0-back, Encased column, Eccentrically loaded columns, Solved examples.

4. **Tension Members**
   Introduction, Net sectional area, Permissible stress, Design of axially loaded tension member, Lug angle, Tension splice.

5. **Column Bases & Footings**
   Introduction, Types of column bases, Slab base, Gusset base, Welded column bases, Design of hold-down angles and base plates, Grillage footing, Solved examples.

6. **Beams**
   Introduction, Design procedure, Built-up beams, Plate thickness, Simple beam end connections.

7. **Industrial Buildings**

Introduction, Planning, Structural framing, Types, Roof and side coverings, Elements of anindustrial building, Design steps of industrial building, Solved examples.

8. **Beams Column**
   Introduction, Eccentricity of load, Eccentrically loaded base plates.
9. **Elementary Plastic Analysis & Design**
   Introduction, Idealized stress-strain curve for mild steel, Scope of plastic analysis, Ultimate load carrying capacity of tension members, Ultimate load carrying capacity of compression members, Flexural members, Shape factor, Load factor, Mechanism, Plastic collapse, Conditions in plastic analysis, Principle of virtual work, Theorems of plastic analysis, Methods of analysis, Cancellation of hinge in the combined mechanism [beam + panel), Design, Limitations of plastic analysis, Plastic design vs elastic design, Solved examples.

10, PLATE GIRDER
Introduction, Economical depth and self-weight of plate girder, Design of web, Design of flanges, Curtailment of flange plates, Riveted connections, Web stiffeners, Web splice, Flange splice.

BTC 7 : ADVANCED STRUCTURAL ANALYSIS

1. FUNDAMENTAL CONCEPTS:
Introduction, historical background, outline of presentation, stresses and equilibrium, boundary conditions, strain-displacement relations, stress-strain relations, temperature effects, potential energy and equilibrium, alerkin's method, von mises stress, computer programs, historical references.

2. ONE-DIMENSIONAL PROBLEMS
Introduction, finite element modeling, coordinates and shape functions, the potential-energy approach, the galerkin approach, assembly of the global stiffness matrix and load vector, the finite element equations; treatment of boundary, quadratic shape functions, temperature effects.

3.TWO-DIMENSIONAL PROBLEMS USING CONSTANT STRAIN TRIANGLES:
Introduction, finite element modeling, constant-strain triangle (cst), orthotropic materials, meshgen input file.

4. BEAMS AND FRAMES:
Introduction, finite element formulation, load vector, boundary considerations, shear force and bending moment, beams on elastic supports, plane frames, some comments, three-dimensional problems in stress analysis, finite element formulation, stress calculations, mesh preparation, hexahedral elements and higher order elements, problem modeling, frontal method for finite element matrices.

5. DYNAMIC CONSIDERATIONS:
Introduction, element mass matrices, evalution of eigenvalues and eigenvectors, interfacing with previous finite element programs and a program for determining critical speeds of shafts, guyan reduction, rigid body modes.

BTC 8 : ENVIRONMENTAL ENGINEERING

1. MAN, ENVIRONMENT, ECOSYSTEMS & THEIR INTER RELATIONSHIP

Introduction, Effects Of Pollutants On Living System, Some Pollution Syndromes

TYPES OF ENVIORONMENT POLLUTATANTS AND THEIR SOURCE OF EFFECTS

Pollution, Agricultural Pollution, Mining Pollution, Municipal Pollution, Industrial Pollution, Classification Of Pollution And Pollutants, Devising Technological Abatement Processes, Effects Of Pollutants On Living System, Fire Management, Rangelands, Parks And Nature Preserves, Case Study Reintroducing Wolves To Yellowstone, World Parks And Preserves

3. INDOOR POLLUTION, AIR POLLUTION, SOURCE & THEIR EFFECTS AND CONTROL TECHNOLOGIES

Introduction, Air Pollution Episodes, Air Pollution And Its Abatement, *Effects Of Air Pollution ,* National Air Pollution Control Administration, Air Pollution Control, Clean Air Legislation, Sources Of Air Pollution, Control Of Air Pollution, *Types Of Gas Changing Device*

4. NOISE POLLUTION & ITS ABATEMENT

Introduction, Noise Pollution Sources, Effect Of Noise On Physical Health, Noise Control

5. INDUSTRIAL WASTE TREATEMENT AND DISPOSAL

Characteristics Of Wastes, Physical Characteristics, Chemical Characteristics, Biological Characteristics, Treatment Of Industrial Effluents, Physical Treatment, Chemical Treatment, Biological Treatment, Disposal Of Industrial Effluents, Treatment Of Industrial Effluents, Physical Treatment, Air Pollution Problems In Industry, Nuclear Wastes, Health And Environmental Effects, Refinery And Fuel Fabrication Wastes, Biomedical Wastes, Control Of Biomedical Wastes, Identifying A Hazardous Waste,
Role Of The Wastes Exchange, Treatment And Disposal Of Chemical Wastes

6. SOLID WASTE DISPOSAL

Introduction, Characteristics Of Solid Wastes, Characteristics, Considerations In Solid Waste Management, Collection Systems

7. ENVIRONMENTAL IMPACT ASSESSMENT AND AUDITING

Historical Perspective, Elements Of The Environmental Impact, Project Design And Construction, Project Operations, Site Characteristics, Institutional And Sociopolitical Framework, Possible Impacts, Socioeconomic Analysis, Alternatives
Availability Of Information, Availability Of Resources, Environmental Pollution And Its Control In The Pulp And Paper Industry, NEPA And EIS, Introduction, Sustainable Developoment, Environment Impact Assessment, Project Operations, Site Characteristics, Institutional And Sociopolitical Framework, Socioeconomic Analysis, Alternatives, Availability Of Information, Availability Of Esources

8. INTRODUCTION TO ENVIORONMENTAL LAWS AND POLICIES

Environmental Policy, NEPA And EIS, Environmental Law, International Treaties And Conventions

9. GLOBAL ISSUES

Best Practicable Means (BPM), Devising Technological Abatement Processes, Environmental Standards, State Of World Environment, International Treaties And Conventions, Dispute Resolution And Community-Based Planning, The Dilemma Of Industrialization And Urbanization

BTC 9 : ADVANCED FOUNDATION ENGINEERING

1. MAT FOUNDATIONS:

Introduction, combined footings, common types of mat foundations, differential settlement of mats, field settlement observations for mat foundations, compensated foundation, structural design of iv/at foundations.

2. SHEET PILES WALLS:

Introduction, construction methods, cantilever sheet pile walls, special cases for cantilever walls penetrating a sandy soil, cantilever sheet piling penetrating clay, special cases for cantilever walls penetrating clay, anchored sheet pile walls, free earth support method for penetration of sandy soil, moment reduction for anchored sheet pile walls, computational pressure diagram method for penetration into sandy soil, free earth support method for penetration of clay, holding capacity of anchor plates in sand, ultimate resistance of tiebacks, field observations for anchored sheet pile walls.

3. BRACED CUTS:

Introduction, pressure envelope for braced-cut design, pressure envelope for cuts in layered soil, design of various components of a braced cut, bottom heave of a cut in clay, stability of the bottom of a cut in sand, lateral yielding of sheet piles and ground settlement.

4. PILE FOUNDATION:

Introduction, types of piles and their structural characteristics, estimating pile length, installation of piles, load transfer mechanism, equations for estimating pile capacity, meyerhof's method for estimating qp, vesic's method for estimating qp, janbu's method for estimating qp, coyle and castello's method for estimating qp in sand, other correlations for calculating qp with spt and cpt results, frictional resistance (qs) in sand, frictional (skin) resistance in clay, general comments and allowable pile capacity, point bearing capacity of piles resting on rock, pile load tests, comparison of theory with field load test results, elastic settlement of piles, laterally loaded piles, pile-driving formulas, stress on piles during driving, pile capacity for vibration-driven piles, negative skin friction, group efficiency, ultimate capacity of group piles in saturated clay, piles in rock, elastic settlement of group piles, consolidation settlement of group piles,

5. DRILLED SHAFT FOUNDATIONS:

Introduction, types of drilled shafts, construction procedures, other design considerations, load transfer mechanism, estimation of load-bearing capacity, drilled shafts in sand: load-bearing capacity, settlement of drilled shafts at working load, lateral load-carrying capacity, drilled shafts extending into rock.

6. FOUNDATIONS ON DIFFICULT SOILS:

Introduction, definition -and types of collapsible soil, physical parameters for identification, procedure for calculating collapse settlement, foundation design in soils not susceptible to wetting, foundation design in soils susceptible to wetting, case histories of stabilization of collapsible soil, general nature of expansive soils, laboratory measurement of swell, classification of expansive soil on the basis" of index tests, foundation considerations for expansive soils, construction on expansive soils, general nature of sanitary landfills, settlement of sanitary landfills.

7. SOIL IMPROVEMENT AND GROUND MODIFICATION:

Introduction, general principles of compaction, correction for compaction of soils with oversized particles, field compaction, compaction control for clay hydraulic barriers, vibroflotation, precompression, sand drains, an example of a sand drain application, prefabricated vertical drains, cement stabilization, fly-ash stabilization, stone columns, sand compaction piles, dynamic compaction.

BTC10: 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

Civil

Course Structure

Fourth Year

Seventh Semester

Syllabus

Paper Code	Name of the Subject
BEC1	Irrigation Engineering
BEC2	Prestressed Concrete & Adv. Design Of Structure
BEC3	Quantity Surveying & Contract. & Tenders
BEC4	Finite Elements Method of civil Engineering
BEC5	Elective-I
BEC2P	Prestressed Concrete & Adv. Design Of Structure Practical
BEC3P	Quantity Surveying & Contract. & Tenders Practical

BEC1: IRRIGATION ENGINEERING

1. INTRODUCTION TO HYDROLOGY

Introduction, Water Resources, Hydrologic Cycle, Scope and Applications of Hydrology

2. PRECIPITATION

Introduction, Types of Precipitation, Precipitation in India, Forms of Precipitation, Measurement of Precipitation, Types of rain Gauges, Modern Methods of measurement of Precipitation, Optimum Number of Raingauge Stations, Statistical Method of Determination of Optimum Number of Rain Gauges, Estimating Missing Rainfall Data, Double Mass Curve Analysis, Representation of Rainfall Data, Intensity Duration and Depth-duration Frequency Curve, Depth Area Duration Analysis, Determination of Average Precipitation over on area, Illustrative Problems

3. ELEMENTARY CONCEPTS OF EVAPORATION AND INFITRATION

Introduction, Evaporation and Factors affecting Evaporation, Measurement of Evaporation, Methods of Reducing Evaporation from Lakes or Reserviors, Evarporation from Land surfaces, Transpiration, Evapo-transpiration, Infiltration, Methods of Determining Infiltration Rate, Infiltration Capacity Curve, Infiltration Indices, Illustrative problems

4. STREAM GAUGING

Introduction, Selection of site, Determination of River stage, Stream flow measurements, Stage-Discharge curve

5. RUNOFF

Introduction, Run off and its Classification, Factors Affecting Runoff, Rainfall-Runoff Relationship, Methods of Estimating Runoff, Hydrograph, Factor Affecting Shape of Hydrograph, Methods of Base Flow Separation, Unit Hydrograph, S-Curve or S-Hydrograph, Synthetic Unit Hydrograph, Estimation of Peak floods

6. INTRODUCTION TO IRRIGATION

Introduction, Functions and Necessity of irrigation, Advantages of Irrigation, Disadvantages of Irrigation, Irrigation Development and present status in India

7. WATER REQUIREMENTS OF CROPS

Introduction, Soil classification, Soil moisture and water requirements of crops, Water requirements of crops: Definition of terms, Factors affecting duty of water, Crop seasons in India, Crop seasons in Maharashtra, Water Requirements of crops, Definitions of some terms, Optimum Crop Requirements, Command Areas, Computations of capacity of the canal, Irrigations of Efficiencies, Illustrative Problems

8. RESERVIOR PLANNING

Introduction, Types of Reservior, Types of Developments, Investigations for Reservior Planning, Selection of suitable site for a Reservior, Zones in the Reservior starage, Reservior Starage Capacity and yield, Computation of Reservior Capacity for a specific yield, Safe yield from a Reservior of Given capacity, Reservior sedimentation, Determination of useful Life of Reservior, Flood Routing, Selection of Dam site and Economic Height of Dam, Reservior Losses, Multipurpose Reservior Planning, Flood Routing, Benefit Cost Ratio Analysis, Apportionment of Total cost of a Multipurpose Reservior, Application of Optimisation techniques: Systems Approach, Economics of Reservior planning, Illustrative Problems

9. GROUND WATER HYDROLOGY

Introduction, Occurrence of Ground Water, Definition of Terms, Divisions of Sub-surface Water, Types of Aquifer, Movement of Ground Water, Hydraulics of Well, Determination of Coefficient of Transmissibility, Well Losses, Specific Capacity of Wells and Efficiency of Well, Well Irrigation, Tube Wells, Construction of Tube Wells, Well Completion and its Maintenance, Well Shrouding and Well Development, Radial Wells or Collectors, Comparison Between Well Irrigation and Canal Irrigation system

10. WATER LOGGING AND LAND DRAINAGE

Introduction, Ill Effects of Water Logging, Causes of Water Logging, Remedial Measures Drainage of Irrigation Land, Advantages of Tile Drains Over Open Drains, Merils of Tile Drains, Spacing and Depth of Tile Drains, Reclamation of Land

11. LIFT IRRIGATION SCHEMES

Introduction, Planning of Lift Irrigation Schemes, Contour Survey of the area, Component parts of Lift Irrigation Schemes, Classification of Lift Irrigation Schemes, Design Criteria, Determination of Water rates

12. APPLICATION OF WATER

Introduction, Basic functions of Irrigation water, Methods of applying Irrigation water, Modern methods of irrigation system, Distribution of water, Rotational application, Water management

13. ASSESSMENT OF LANAL REVENUE

Introduction, Considerations for determining the water charges, Criteria for fixing water charges, Methods of Assessment

BEC2: PRESTRESSED CONCRETE & ADV. DESIGN OF STRUCTURE

1. INTRODUCTION TO PRESTRESSED CONCRETE

Introduction, Reinforced Concrete Versus Prestressed Concrete, Prestressing System, Loss Of Prestress, Steel For Prestressing, Basic Concepts Of Prestressed Concrete, Homogeneous Beam Concept, Pressure Line, Load Balancing Concept, Shear And Pricipal Streses

2. SYSTEMS OF PRESTRESSING

Classifications Of Prestressed Concrete Members, Hoyer System, The Freyssinet System, The Magnel Balton System, Gifford Udall System, P.S.C.Monowire System, C.C.L Standards System, LEE-McCall System

3. PRESTRESSED CONCRETE BEAMS

Introduction, Limit State Of Collapse , Limit State Of Collapse In Shear , Limit State Of Serviceability , Prestressed Concrete Poles, Other Design Considerations, Selection Of Sectional Dimensions, Detailing Of Reinforcement, Limits State Of Serviceability For Deflection

4. END BLOCK

Introduction, Magnel's Method, Guyon's Method, Beam With Two Anchor Plates Symmetricaly Placed On The Face Of The Beam , Cable At An Eccentricity

5. PRESTRESSED CIRCULAR TANKS AND PIPES

Introduction, Principles of Circumferencential Prestressing, Methods Of Design

6. SMALL PRESTRESSED CONCRETE DAMS

Introduction, Design Requirements, Design

7. PRESTRESSED CONCRETE PILES

Introduction, Convenient Ways of Lifting A Pile, Maximum Length Of Pile

BEC3: QUANTITY SURVEYING AND CONTRACT & TENDERS

1. ESTIMATING

Introduction, Definition, Data Required for Preparation of an estimate, Types of Estimates, Items of Work, Description of an Item of Work, Measurement of Works, Guidelines for Measurements, I.S. mode or Units of Measurements, Plinth Area, Floor Area, Carpet and F.S.I.

2. APPROXIMATE ESTIMATES

Introduction, Definition, Purpose of Necessity, General Principle of Preparing Approximate Estimates, Methods of Preparing Approximate Estimates

3. TAKING OUT QUANTITIES

Introduction, Definition, General procedure of measurement of works, Methods of taking out Quantities, Comparison of English and P.W.D. method, Various items of works, Prime Costs (P.C.) and Provisional Sums (P.S.), Provisional Quantities, Spot Items, Contingencies, Work-charged Establishment, Centage Charges, Building Estimate Methods, Checks over the Accuracy of Detailed Estimates, Relation between Cost of various Items with respect to Total Cost of Building, Some typical estimates of Works, Schedule of Rates for Common Items of works in Building construction

4. ANALYSIS OF RATES (OR PRICES)

Introduction, Purpose of Analysis of Rates, Factors Affecting Rate analysis, Task Work, Table showing the Task Work, Table showing Materials Required for Different Items of Works, Labour Requirements for different Items of Works, Computations of Quantities of Materials required for Various Items of Works, Increase in Rates or Prices for Additional Floors, Water Charges, Requirements of Cement bags for various items of works, Approximate Rates of Materials of Construction, Approximate Rates of Equipment/Machinery required for works, Transportation of Materials and cost, Rates specified for various categories of Laborers in Building Industry, Analysis of Rates of Principles of Items of Work in the Building Construction

5. SPECIFICATIONS

Introduction, Definition of Specifications, Purpose of Specifications, Types of Specifications, Classification of Specifications According to Purpose, Requirements of Good Specifications, Detailed Specifications, Standard Specifications, Detailed Specifications for Common Items of Building Work

6. VALUATION OF PROPERTY

Introduction, Cost Price and Value, Purpose (or Object) of Valuation, Factors affecting Valuation of a Property, Different Nomenclatures for the Value, Year Purchases (Y.P.), Sinking Fund and Sinking Fund Installment, Valuation Tables, Annuity, Ownership of the Property, Returns from the Property, Depreciation and Methods of Computations of Depreciation, Mortgage, Easement, Methods of Valuation Property, Fixation of Rent of a Property, Reversionary Value of Land (or Land on Reversion), Illustrative Problems, Valuation of a (Building) Property

7. CONTRACTS AND TENDERS

Methods of Executing Works, Tenders, Contracts

BEC4: FINITE ELEMENTS METHOD OF CIVIL ENGINEERING

1. INTRODUCTION

Introduction. Historical Background. Design Considerations. Need Of Finite Element Method. The Process Of Finite Element Method, Field And Boundary Conditions, Steps Involved In Fem, The Standard Discrete System , Transformation Of Co-Ordinates.

2. **FINITE ELEMENTS OF ELASTIC CONTINUUM DISPLACEMENT APPROACH**
   Introduction, Direct Formulation Of Finite Element Characteristic, Generalized Nature Of Displacements, Strains, And Stresses, Generalization To The Whole Region--Internal Nodal Force Concept Abandoned, Displacement Approach As A Minimization Of Total Potential Energy, Convergence Criteria, Discretization Error And Convergence Rate, Displacement Functions With Discontinuity Between Elements--Non-Conforming Elements And The Patch Test, Bound On Strain Energy In A Displacement Formulation, Direct Minimization.

3. **GENERALIZATION OF THE FINITE ELEMENT CONCEPTS WEIGHTED RESIDUAL AND VARIATIONAL APPROACHES**
   Introduction, Weighted Residual Methods, Approximation To Integral Formulations: The Weighted Residual Method, Virtual Work As The 'Weak Form' Of Equilibrium Equations For Analysis Of Solids Or Fluids, Variational Principles, Establishment Of Natural Variational Principles For Linear, Self-Adjoint Differential Equations, Maximum, Minimum, Or A Saddle Point, Constrained Variation Principles, Lagrange Multipliers And Adjoin Functions.

4. **STRAIN PLANE STRESS AND PLANE**
   Introduction, Element Characteristics, Some Practical Applications, Special Treatment Of Plane Strain With An Incompressible Material.

5. **AXI-SYMMETRIC STRESS ANALYSIS**
   Introduction, Element Characteristics, Some Illustrative Examples.

6. **THREE – DIMENSIONAL STRESS ANALYSIS**
   Introduction, Tetrahedral Element Characteristics.

7. **ELEMENT SHAPE FUNCTIONS SOME GENERAL FAMILIES OF C_0 CONTINUITY**
   Introduction, Two – Dimensional Elements, Completeness Of Polynomials, Rectangular Elements – Lagrange Family, Rectangular Elements – 'Serendipity' Family, Triangular Element Family, One-Dimensional Elopements, Three-Dimensional Elements, Other Simple Three-Dimensional Elements.

8. **CURVED, ISOPARAMETRIC ELEMENTS AND NUMERICAL INTEGRATION**
   Introduction, Parametric Curvilinear Co-Ordinates, Geometrical Conformability Of Elements, Variation Of The Unknown Function With In Distorted, Curvilinear, Elements, Continuity Requirements, Transformations, Element Matrices, Area And Volume Co-Ordinates, Convergence Of Elements In Curvilinear Co-Ordinates, Numerical Integration.

9. **SOME APPLICATIONS OF ISOPARAMETRIC ELEMENTS IN TWO- AND THREE-DIMENSIONAL STRESS ANALYSIS**
   Introduction, A Computational Advantage Of Numerically Integrated Finite Elements.

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

In

Civil

Course Structure

Fourth Year

Seventh Semester

Syllabus

ELECTIVE – I

Paper Code	Name of the Subject
BEC5-I	Water Resource System & Planning
BEC5-II	Valuation of real property
BEC5-III	Design of Industrial Structure & bridge
BEC5-IV	Highway Maintenance & Management System

BEC5-I : WATER RESOURCE SYSTEM & PLANNING

1. Introduction :- Methods of irrigation – Water requirements for crops – Hydrology
2. Ground water :- Well irrigation – Reservor planning – General Dams- Gravity dams – Arch & buttress dams – Earth and rock fill dams – Spill ways dam – Diversion head works.
3. Flow irrigation – irrigation channels – Silt theories – Design procedure of an irrigation channel – water logging and canal linking – canal out lets – canal regulation works – Cross drainage works .
4. River Engineering – Water power engineering – Water resources planning.

BEC5-II : VALUATION OF REAL PROPERTY

1. **INTRODUCTION:** General, Doctrine of estate, Types of estates in England, Land systems in India, Cost, Price and valuation, Concept of the term value, Purposes of valuations, Different forms of value, Supply and demand forces, Occupation value and investment value, Factors affecting changes in market value, Concepts of right of compulsory purchase and value in India, Emergence of profession of real estate valuation in India, Role of the valuer, New horizons of valuation
2. **INVESTMENT IN REAL PROPERTY:** General, Characteristics of land, Investment, Investment market, Investment opportunities, Characteristics of ideal investment, Interest on capital, Nature of real property, Factors affecting real property market, Determination of value of real property, Estate brokers
3. **INTERESTS IN REAL PROPERTY:** General, Types of interests, Freehold interests, Leasehold interests, Mortgage, Development process
4. **METHODS OF VALUATION:** General, Methods of valuation for open lands, Methods of valuations for lands with buildings, conclusion
5. **OUTGOINGS:** Definition, Usual types of outgoings, Conclusion
6. **DEPRECIATION:** Meaning of the term, Depreciation as cost in operation, Depreciation as decrease in worth, Methods for estimating cost depreciation, Cost of construction, Cost depreciation and value depreciation, Reproduction cost and replacement cost, Conclusion

7. **VALUATION OF LICENSED PREMISES:** General principle of valuation, Valuation of a cinema, valuation of a hotel
8. **VALUATION OF LIFE INTERESTS:** General, Types of life interest, Mortality tables, Compilation of mortality tables, Application of mortality tables, Jellicoe's formula
9. **VALUATION FOR RATING:** General, Definitions, Principles of rating, Rent as evidence of annual value, Hypothetical tenant and hypothetical rent, Exemptions from ratability, Process of assessment, Methods of assessment, Conclusion
10. **VALUATION OF AGRICULTURAL LANDS:** General, Importance, Factors affecting value of agricultural land, Methods of valuation of agricultural lands, Agricultural land and direct tax laws
11. **FINANCE FOR INVESTMENT IN REAL PROPERTIES:** General, Terms of borrowing, Sources of borrowing, Genaring and equity, Conclusion
12. **VALUATION TABLES:** General, Valuation tables I to VIII
13. **MISCELLANEOUS TOPICS:** General, Capitalized value, Cost inflation index, Deferred or reversionary land value, Discounted cash flow, encumbrance factor, Floating F.S.I. , Forms of rent, life of structures, Mobilization fund, Rate of interest, Record of rights, Valuation as a going concern, Year's Purchase
14. **EASEMENTS:** General, Definition, Essential characteristics of easements, Creation of easements, Extinguishment of easements, Easements and natural rights, Effect on valuation due to easement
15. **STANDARD RENT:** General, Objects of Rent Act, Meaning of standard rent, Exemptions from the Rent Act, Process of fixing standard rent, Methods of ascertaining standard rent, Important factors, Inheritance of tenancy right, Paying guests and Rent Act, Recovery of possession from tenant by landlord, Conclusion
16. **COMPULSORY ACQUISITION OF LAND:** General, The land Acquisition Act, 1894, Important aspects of the L. A. Act,1894, Conclusion
17. **THE TRANSFER OF PROPERTY ACT:** General, Meaning of transfer, Definition of transfer of property, Requirements of a valid transfer, Contingent interest, Conditional transfer, Sales of immoveable property, Mortgages of immovable property, Leases of immoveable property, Exchanges, Gifts, Actionable claims
18. **URBAN LAND CEILING ACT:** General, Selection of towns, Objects of the Act, Important provisions in the Act, Effects of the U.L.S. Act, Summary

BEC5-III : DESIGN OF INDUSTRIAL STRUCTURE & BRIDGE

I) HYDRAULIC DESIGN

Introduction, Catchments, River Channels,

II) STRUCTURAL DESIGN

Introduction, Masonry Arch Bridges, Pipe Culverts, Slab Bridges, Box Culverts, Beam and Slab Bridges, Plate Girder Bridges, Composite Bridges, Substructures, Bridge Foundations, Bearing and Expansion Joints.

BEC5-IV : HIGHWAY MAINTENANCE & MANAGEMENT SYSTEM

1. Maintenance Of Road Surface, Shoulders, Roadway Drainage, Bridge and Other Structure, Roadside, Amenity, Equipment.
2. High Profile Maintenance
3. Carriageway Maintenance.
4. Footways /Shoulders
5. Street Lightening and Illuminated Traffic Signs
6. Aid To Movement.
7. Road Assessment & Management System
8. Accident Precaution
9. Winter Maintenance.
10. Maintenance Of Highway Structure.

11. Maintenance and Management System Include Development Of Annual Work Programme Budgeting and Allocation Recovery, Work Authorization and Control, Scheduling, Performance Evaluation, Fiscal Control
12. Maintenance Of Approaches.
13. Vegetation Management and Control, Maintenance Of Rest Area.
14. Maintenance and Traffic Control & Safety Devices
15. Pavement Rehabilitation
16. Milling Of Pavement.
17. Pavement Recycling

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

In

Civil

Course Structure

Fourth Year

Eight Semester

Syllabus

Paper Code	Name of the Subject
BEC6	Structural Dynamics
BEC7	Construction & Planning Management
BEC8	Planning and design of airport
BEC9	Project
BEC6P	Structural Dynamics Practical

BEC6: STRUCTURAL DYNAMICS

CHAPTER 1: SINGLE DEGREE OF FREEDOM SYSTEMS

1. Equations of motion
2. Free vibrations, damping
3. Response to harmonic excitation
4. Response to general dynamic loading
5. Duhamel's integral.
6. Numerical methods

CHAPTER 2: RESPONSE SPECTRUM

1. Concept
2. Definition, pseudovelocity and pseudo-acceleration response spectra
3. Analysis of SDOF systems using response spectrum
4. Deference between response spectrum and design spectrum

CHAPTER 3: MULTI DEGREE OF FREEDOM SYSTEMS

1. Equations of motion
2. Free vibrations, natural frequencies and modes
3. Free vibration analysis for classically damped systems
4. Damped matrix
5. Rayleigh damping
6. Modal analysis
7. Earthquake analysis of linear systems by response spectrum method

CHAPTER 4: CONTINUOUS SYSTEMS

1. Equations of motion
2. Natural frequencies and modes
3. Modal orthogonally
4. Earthquake response spectrum analysis

CHAPTER 5: APPROXIMATE METHODS

1. Rayleight's method

2. Dunkerley's method

BEC7: CONSTRUCTION & PLANNING MANAGEMENT

CHAPTER 1:

1. Introduction to construction management
2. Construction industry and its practices
3. Problems of construction industry
4. Management problems in construction
5. Methodology of system design and techniques in construction
6. Elements of engineering economies
7. Probability and statistics
8. Allocation models, coordination and inventory model
9. Queuing model
10. Uncertainty principles
11. Simulation

CHAPTER 2:

1. Engineering economics in construction management
2. Time value of money, interest tables and rates of payment and return
3. Depreciation of capital assets
4. Evaluation of feasibility
5. Public project analysis and evaluation
6. Case study modules

CHAPTER 3:

1. Use of elementary statistics and probability theory
2. Statistical approach, probability distributions, expected value analysis, parameter estimation, statistical inference, quality control using statistical tools, regression and correlation analysis
3. Case study modules

CHAPTER 4:

1. Allocation models in construction
2. Transportation model and its solution
3. Assignment model
4. Sequencing
5. Case study modules

CHAPTER 5:

1. CPM and PERT network in construction
2. Application in the field of construction, planning of scheduling in the field of construction, planning of scheduling phase and control phase, optimization studies, case study modules

CHAPTER 6:

1. Inventory management
2. Inventory costs, lead and economic order quantity, inventory models, ABC analysis, inventory management

CHAPTER 7:

1. Queuing models and applications in construction technology
2. Queues and queuing theory, models of queues, case study modules

CHAPTER 8:

1. Construction projects management
2. Organisational aspects of sectors such as housing, institutional and commercial, industrial and heavy engineering
3. Contracts theory and practice
4. Human resources development and construction industry

BEC8: PLANNING AND DESIGN OF AIRPORT

1. INTRODUCTION & AIRCRAFT CHARACTERISTICS

General, Requirements Of Aircraft Types, Field Length Regulations, Restrictions On Payload- Range Performance, Weight Components, Aeroplane Components Parts, Military And Civil Aircrafts, Civil Military Co-Ordination, Classification Of Flying Activity, Relation Of Aircraft To Landing Facility, Aircraft Characteristics, Future Trends In Aircraft Design

2. AIRPORT OBSTRUCTIONS

Zoning Laws, Classification of Obstructions, Turning Zone

3. RUNWAY DESIGN

Runway Orientation, Basic Runway Length, Correction For Elevation, Temperature And Gradient, Airport Classification Runway Geometric Design

4. AIRPORT CAPACITY AND CONFIGURATION

Airport Capacity, Runway Capacity, Gate Capacity, Taxiway Capacity, Runway Configurations, Runway Intersection Design

5. TAXIWAY DESIGN

Factors Controlling Taxiway Layout, Geometric Design Standards, Exit Taxiways, Fillets, Separation Clearance, Holding Apron, Turnaround or Bypass Taxiway

6. TERMINAL AREA

Building and Building Area, Vehicular Circulation and Parking Area, Apron, Hangar, Blast Considerations, Typical Airport Layouts

7. AIRPORT PLANNING

General, Airport Master Plan, Regional Planning, Data Required Before Site Selection, Airport Site Selection, Surveys For Site Selection, Drawings To Be Prepared, Estimation Of Future Air Traffic Needs

8. STRUCTURAL DESIGN OF AIRPORT PAVEMENTS

Introduction, Various Design Factors, Design Methods For Flexible Pavements, Design Method For Air Field Rigid Pavements, Influence Chart For The Moment Mn In A Concrete Pavement Due To A Load In The Interior Of The Slab, LCN System Of Pavement Design, Joints In Cement Concrete Pavements, Special Consideration For Design Of Pavement Facilities For V/Stol Operations

9. VISUAL AIDS

General, Airport Marking, Airport Lighting

BEC9: Project Guideline

Thinking up a Project

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

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

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

Arranging a Guide

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

Working with the Guide

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

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

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

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

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

important points for carrying out a project

- The organizations or companies offer you a placement for project work out of good will or to get some useful work done. Usually the companies do not provide you

everything required by you. You must settle this right in the beginning of the project with the business that what will you get from them and what you have to arrange yourself.

- Some times a complication arises due to the fact that some aspect of your project work is considered confidential by the company. If this is so, it is your responsibility to get whatever clearance is necessary from the organization right in the beginning as essential parts like system analysis and design, flow charts etc. can not be missing from a project report.
- Make sure you allow enough time for writing report. It is strongly recommended that do some writing work as you carry out the project rather than leaving write up until the end. You must allow at least a month to finally write the report. There has to be enough time for the supervisor to read and comment on it and for student to make changes (sometimes extensive) on the basis of the comments. You may have to prepare two or three drafts before the final submission. Remember that it is mainly the project reports that get examined. An external supervisor receives a pile of project reports written by people who he does not know. If a project produced some software he even may not get time to see it running. In most cases he forms his judgment purely on the basis of the report. Please make your report as readable as possible content wise as well as presentation wise.

1. **Introduction:** This must contain background, any previous work done in the area of your project, your objective and other relevant material that may be helpful to further explain your project work.
2. **The existing system:** The study of the present system; problems in existing system.
3. **System design:** The proposed system; Any specific problem encountered at how you handled them.
4. **Implementation of the system:** Implementation issues and their justification.
5. **Conclusions:** Any shortcoming; your assessment of your work; comparison of your work with similar works; silent features of your work any feature modification. Real times applications of your project work.

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

For example:

Langdrof, 'Theory of Alternating Current Machinery" Tata McGraw Hill, July 2003.

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