Mohan Lal Sukhadia University
Udaipur

B. Tech. Program
(Effective from session 2021-2022)

Civil Engineering

Semesters III

Syllabus

BT3CE01-CT01: ADVANCE ENGINEERING MATHEMATICS-I

Credit: 3 **Max. Marks: 150 (IA:30, ETE:120)**

3L+0T+0P **End Term Exam: 3 Hours**

SN	Contents	Hrs.
1	**Numerical Methods – 1:** Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Gauss's forward and backward interpolation formulae. Stirling's Formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae. Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.	8
2	**Numerical Methods – 2:** Numerical solution of ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge- Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Solution of polynomial and transcendental equations-Bisection method, Newton-Raphson method and Regula-Falsi method.	8
3	**Laplace Transform:** Definition and existence of Laplace transform, Properties of Laplace Transform and formulae, Unit Step function, Dirac Delta function, Heaviside function, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace transforms method.	8
4	**Fourier Transform:** Fourier Complex, Sine and Cosine transform, properties and formulae, inverse Fourier transforms, Convolution theorem, application of Fourier transforms to partial ordinary differential equation (One dimensional heat and wave equations only).	8
5	**Z-Transform:** Definition, properties and formulae, Convolution theorem, inverse Z-transform, application of Z-transform to difference equation.	8
	Total	40

BT3CE02-CT02: TECHNICAL COMMUNICATION

Credit: 2 **Max. Marks: 100 (IA: 20, ETE: 80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hours
1	**Introduction to Technical Communication-** Definition of technical communication, Aspects of technical communication, forms of technical communication, importance of technical communication, technical communication skills (Listening, speaking, writing, reading writing), linguistic ability, style in technical communication.	5
2	**Comprehension of Technical Materials/Texts and Information Design & development-** Reading of technical texts, Reading and comprehending instructions and technical manuals, Interpreting and summarizing technical texts, Note-making. Introduction of different kinds of technical documents, Information collection, factors affecting information and document design, Strategies for organization, Information design and writing for print and online media.	5
3	**Technical Writing,** - Technical writing process, forms of technical discourse, Writing, drafts and revising, Basics of grammar, common error in writing and speaking,	5
4	**Grammar and Editing** Study of advanced grammar, Editing strategies to achieve appropriate technical style, Introduction to advanced technical communication. Planning, drafting and writing Official Notes, Letters, E-mail, Resume, Job Application, Minutes of Meetings.	5
5	**Advanced Technical Writing**-Technical Reports, types of technical reports, Characteristics and formats and structure of technical reports. Technical Project Proposals, types of technical proposals, Characteristics and formats and structure of technical proposals. Technical Articles, types of technical articles, Writing strategies, structure and formats of technical articles.	5
	Total	**25**

BT3CE03-CT03: ENGINEERING MECHANICS

Credit: 2 **Max. Marks: 100 (IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	CONTENT	Hrs.
1	**Introduction: objective, scope and outcome of the course.** **Statics of particles and rigid bodies:** Fundamental laws of mechanics, Principle of transmissibility, System of forces (conservative and non- conservative), Resultant force, Resolution of force, Moment and Couples, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem.	6
2	**Plane trusses:** Types of structures, Trusses, Support Conditions, Types of Loadings, Classification of trusses, Determinacy of trusses, Basic assumptions of truss analysis (zero force member, tension or compression member), Method of joints, Method of sections. **Simple Stresses and Strains:** Concept of stress and strain in three dimensions and generalized Hooke's law; Young's modulus, Shear stress, Shear strain, Modulus of rigidity, Complementary shear stress; Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants, Stress and strain thin cylinder and spherical cell under internal pressure.	6
3	**Friction:** Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction. **Springs**: Stiffness of springs, springs in series and parallel, Introduction to laminated plate springs, leaf spring, close coiled helical springs, open coiled springs.	6
4	**Centroid & Moment of inertia (M.I.):** Location of centroid, Moment of inertia (mass and area), Parallel axis and perpendicular axis theorems, M.I of composite section, M.I. of solid bodies, Polar moment of inertia, principle axis and principle moment of inertia.	6
5	**Virtual work:** Principle of Virtual Work, Active forces and active force diagram, Stability of equilibrium. **Work, Energy and Power:** Work of a force, weight and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservation of energy.	6
	TOTAL	**30**

BT3CE04-CT04: SURVEYING

Credit: 3 **Max. Marks: 150 (IA: 30, ETE:120)**

3L+0T+0P **End Term Exam: 3 Hours**

SN	Contents	Hrs.
1	**LINEAR AND ANGULAR MEASUREMENTS** Method of linear measurements, Correction to length measured with a chain/tape, Ranging a survey line; direct and indirect Angular measurement by compass, Designation of bearing, Traversing with tape and compass, Correction to measured bearing, Angular measurement by theodolite; Temporary adjustments, Method of horizontal angle measurement and vertical angle, Traverse computation, plotting of traverse and determining the closing error, Balancing traverse.	**8**
2	**LEVELLING** Measurements of elevations methods of levelling; direct/differential, Indirect/Trigonometrical, and Profile/Cross sectional levelling. Digital and Auto level, Errors in levelling, contours and contour lines; methods of contouring; direct and indirect, characteristics, uses, area and vol. measurements.	**8**
3	**CURVE SURVEYING** Elements of simple and compound curves, Types of curves, Elements of circular, reverse, and transition curves. Method of setting out simple, circular, transition and reverse curves, Types of vertical curves, length of vertical curves, setting out vertical curves. Tangent corrections.	**8**
4	**TACHEOMETRY AND PHOTOGRAMMETRY SURVEYING** Advantages of tacheometric surveying, different systems of tacheometric measurements, Stadia system of tacheometry, distance elevation formulae for horizontal sights. Determination of tacheometric constants, distance and elevation formulae for inclined sights with staff vertical. Introduction to basic concepts perspective geometry of aerial photographs, relief and tilt displacements, Terrestrial Photogrammetry, flight planning	**8**
5	**SETTING OUT WORKS & MODERN FIELD SURVEY SYSTEMS** Instruments and methods for laying out buildings, setting out culverts, setting out sewer lines. Principle of E.D.M. (Electronic Distance Measurements), Modulation, Type of E.D.M., Distomat, Total station, parts of total station, advantages and application.	**8**
	TOTAL	**40**

BT3CE05-CT05: FLUID MECHANICS

Credit: 2 **Max. Marks: 100 (IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hrs.
1	**Introduction to objective, scope and outcome of the course.** **Fluids**: Definition, Type of fluids, Ideal fluids, real fluids, Newtonian and non-Newtonian fluids. **Properties of Fluids:** Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.	6
2	**Principles of Fluid Statics**: Basic equations, Pascal Law, Type of pressure:- atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, manometers, Bourdon pressure gauge. **Fluid Dynamics**: Control volume approach, Euler's equation, Bernoulli's equation and its applications, venture-meter, orificemeter, orifices & mouthpieces, time of emptying of tanks by orifices, momentum and angular momentum equations and their applications, pressure on flat plates and nozzles.	6
3	**Buoyancy**; Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces. Conditions of equilibrium for floating bodies, meta-centre and analytical determination of meta centric height.	6
4	**Kinematics of Flow**: Visualisation of flow, Types of flow: Steady and unsteady, uniform and non-uniform, rotational and irrotaional flow, Laminar and turbulent flow, streamline, path line, streak line, principle of conservation of mass, equation of continuity, acceleration of fluid particles local and convective, velocity, acceleration, velocity potential and stream function, elementary treatment of flow net, vorticity, circulation, free and forced vortex. Fluid mass subject to horizontal and vertical acceleration and uniform rotation	6
5	**Laminar Flow through Pipes**: Laminar flow through pipes, Relation between shear & pressure gradient. Flow between plates & pipes. Hagen- Poiseuille equation, Equations for velocity distribution, pressure difference velocity distribution over a flat plate and in a pipe section, Darcy-Weisbach equation, friction factor , minor losses, pipe networks.	6
	TOTAL	**30**

BT3CE06-CT06: BUILDING MATERIALS AND CONSTRUCTION

Credit: 3 **Max. Marks: 150 (IA: 30, ETE: 120)**

3L+0T+0P **End Term Exam: 3 Hours**

SN	Contents	Hrs.
1	**Introduction to objective, scope and outcome of the course.**	8
	Basic Civil Engineering Materials (Properties, Types and Uses): Stone: Compressive strength, Water absorption, Durability, Impact value, Tensile strength; Bricks: Water absorption, Compressive strength, Effloresces, Dimension and Tolerance; Tiles: Water absorption, Tolerance, Impact value and Glazing; Light weight concrete blocks. **Lime**: classification as per IS, properties, standard tests and uses in construction. **Fly-ash:** Properties and Use in manufacturing of bricks & cement; **Miscellaneous**: Gypsum, Plaster of Paris, PVC materials, Paints, Varnish and Distemper.	
2	**Timber & Steel:** Timber: Definitions of related terms, Classifications and Properties, Defects in Conversion of wood, Seasoning wood, Preservation, Fire proofing, Ply woods, Fibre boards; Steel: Mild steel and HYSD steel, Properties and their use, common tests on steel	8
	Mortarand Plaster: Mortar preparation methods**:** Functions and tests & their uses in various types of pointing & plastering	
	Brick and Stone Masonry: Basic principle of masonry work, different types of bonds, relative merits and demerits of English, Single Flemish and Double Flemish bond. Comparison between stone and brick masonry. General principles, classification of stone masonry and their relative merits and demerits.	
3	**Building Requirements & Construction System:** Building components, their functions and requirements. Types of construction: load bearing and framed structure construction, RCC beam, column and slab construction, Precast and In-situ construction, Relative merits and demerits. Fire resistance construction, FRC. **Ground & Upper floors:** Floor components and their functions, Floor types and Selection of flooring, construction details of ground and upper floors, merits and demerits.	7
4	**Foundation & Site Preparation:** Purpose, types of foundation: like shallow, deep, pile, raft, grillage foundation and their suitability. Depth of foundation, Sequence of construction activity and co-ordination, site clearance, layout of foundation plan.	8

	Temporary structures: Types & methods of shoring, underpinning and scaffolding.	
	Damp Proofing: Causes and Effects of dampness, Methods and materials for damp proofing, Methods and materials for anti-termite treatment. **Construction and Expansion Joints:** Requirements, Types material used, Construction details.	
5	**Arches and Lintels:** Terms used, types of arches and their construction detail, types of lintels and constructions. **Partition Wall:** Types, purpose and use of partition wall.	**8**
	Stairs: Terms used, requirements of good staircase, classification, construction details and suitability of different types of stairs, Lifts and Ramps.	
	Roof and Roof Covering: Purposes, classification of roofs, terms used. Introduction to Solid slab, Flat slab, Shell Roofs and Pitched roofs, and their constructional features. Types of pitched roofs and Trusses, typical constructional details; Roof covering materials, types and typical constructional details.	
	Total	**40**

BT3CE07-CT07: ENGINEERING GEOLOGY

Credit: 2 **Max. Marks: 100 (IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hrs.
1	**Introduction to objective, scope and outcome of the course.** **General Geology**: Branches and Scope of Geology, Types of Weathering & Geological work of natural agencies like River & Wind. Geological Time Scale. Physical Properties of Minerals.	6
2	**Petrology:** Formation, Texture, Structure and Classification of Igneous, Sedimentary and Metamorphic Rocks. Engineering Properties of Rocks for Building & Road Material. Laboratory and Field & in-situ Test for Site Construction.	6
3	**Structural Geology:** Causes, Terminology, Classification, Recognition, Effects and Engineering consideration of Fold, Fault, Joints and Unconformities.	6
4	**Engineering Geology:** Geophysical methods as applied to Civil Engineering for Subsurface Analysis (Electrical and Seismic methods). Terminology, Types and Geological consideration for site selection of Dam & Tunnel.	6
5	**Remote Sensing & GIS:** Application of Remote Sensing and GIS in Various fields of Civil Engineering.	6
	TOTAL	30

BT3CE08-CP01: SURVEYING LAB

Credit: 2 **Max. Marks: 100 (IA:4, ETE:60)**
0L+0T+4P

List of Experiments

1. Linear Measurement by Tape:
   a. Ranging and Fixing of Survey Station.
   b. Plotting Building Block by offset with the help of cross staff.
2. Compass Survey: Using Surveyor's and Prismatic compass
   a. Measurement of bearing of lines
   b. Adjustment of included angles of compass traverse.
3. Levelling: Using Tilting/ Dumpy/ Automatic Level
   a. To determine the reduced levels in closed circuit.
   b. To carry out profile levelling and plot longitudinal and cross sections for road.
4. Theodolite Survey: Using Vernier Theodolite
   a. To carryout temporary adjustment of Theodolite & Measurement of horizontal and vertical angle: by method of repetition and method of Reiteration.
   b. To measure and adjust the angles of a braced quadrilateral.
5. Trigonometric Levelling: To determine the Height of an object by trigonometric levelling:
   a. By using Instruments in same vertical plane.
   b. By using Instruments in different vertical planes.
6. Tacheometry Survey:
   a. To determine the tachometric constant.
   b. To determine the horizontal and vertical distance by tachometric survey.
7. To study the various electronic surveying instruments like EDM, Total Station etc.

One-week Survey Camp for topographic/ project survey/Contouring be arranged before or after Term End Exam.

BT3CE09-CP02: FLUID MECHANICS LAB

Credit: 01 **Max. Marks: 50 (IA: 20, ETE:30)**
0L+0T+2P

List of Experiments

1. To study the various pressure measuring devices
2. To verify the Bernoulli's theorem.
3. To calibrate the Venturi-meter.
4. To calibrate the Orifice-meter.
5. To determine Metacentric Height.
6. To determine C_c, C_v, C_d of an orifice.
7. To determine C_d of a mouthpiece.
8. To determine C_d of a V-notch.
9. To determine viscosity of a given fluid.
10. To study the velocity distribution in pipes.

BT3CE10-CP03: COMPUTER AIDED CIVIL ENGINEERING DRAWING

Credit: 2 **Max. Marks: 100 (IA:40, ETE:60)**
0L+0T+4P

List of Assignments

To study and draw the labelled sketch of different Building Components on sheets with exposure to CAD:

1. Drawing of walls
    a. Brick and Stone masonry
    b. Cross section of external wall from foundation to parapet
    c. Partition wall, cavity wall and
2. Pointing, Arches, Lintels and Floors
3. Doors and Windows
4. Stairs, Cross section of Dog legged stairs
5. Roofs: Flat and Pitched roof (Steel truss)
6. Development of Front Elevation and Sectional Elevation from a given plan
7. Development of Plan, Front Elevation and Sectional Elevation from line diagram

BT3CE11-CP04: CIVIL ENGINEERING MATERIALS LAB

Credit: 01 **Max. Marks: 50 (IA:20, ETE:30)**
0L+0T+2P

List of Experiments

1. To determine properties of following materials:
   A. STONE:
      a. Compressive strength,
      b. Water absorption,
      c. Impact value,
      d. Tensile strength;
   B. Bricks:
      a. Water absorption,
      b. Compressive strength,
      c. Dimension and Tolerance;
   C. Tiles:
      a. Water absorption,
      b. Tolerance,
      c. Impact value
   D. Timber: Compressive and Tensile Strength of Timber across and along the Grain
2. To Study the Properties & Utilization of Fly Ash in Construction
3. To Study the Different Aluminum and Steel Sections
4. To Study the Manufacturing and Use of Concrete Hollow Blocks
5. To Study the Properties and Uses of Kota Stone and its Slurry

BT3CE12-CP05: GEOLOGY LAB

Credit: 01 **Max. Marks: 50 (IA:20, ETE:30)**
0L+0T+2P

List of Experiments

1. Physical Properties of Minerals
2. Physical Properties of Rocks
3. Identification of Minerals in Hand Specimen
4. Identification of Rocks in Hand Specimen
5. Identification of Geological features through wooden Models
    a. Structural Geological Diagrams
    b. Petrological Diagrams
    c. Engineering Geological Diagrams
6. Interpretation of Geological Map (10 Nos.)
7. Dip & Strike Problems (8 Nos.)

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Civil Engineering

Semesters IV

Syllabus

BT4CE01-CT01: ADVANCE ENGINEERING MATHEMATICS-II

Credit: 2 **Max. Marks: 100 (IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	Fourier Series: Fourier series, even and odd functions; Half range series; Change of interval; Exponential form of Fourier series; Harmonic analysis.	6
2	Roots of Nonlinear (Algebraic and Transcendental) Equations: Bisection method, False position method, Newton Raphson method; Convergence of False position and Newton Raphson method. Complex roots of polynomials by Bairstow‟s method.	6
3	Partial Differential Equations: Classifications of partial differential equations; Method of separation of variables to solve Heat equation, Wave equation and Laplace‟s equations.	6
4	Statistics: Correlation and regression; Principle of least square method and curve fitting.	6
5	Probability Distribution Functions: Random variable; Mathematical expectations; Moment generating functions; Discrete and continuous distribution functions; Binomial, Poisson and Normal distributions.	6
	TOTAL	**30**

BT4CE02-CT02: MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTING

Credit-2 **Max. Marks : 100 (IA:20,ETE:80)**
2L+0T+0P **End Term Exam: 2 Hours**

SN		Hours
1	**Basic economic concepts-** Meaning, nature and scope of economics, deductive v/s inductive methods, static and dynamics, Economic problems: scarcity and choice, circular flow of economic activity, national income-concepts and measurement.	5
2	**Demand and Supply analysis-** Demand-types of demand, determinants of demand, demand function, elasticity of demand, demand forecasting –purpose, determinants and methods, Supply-determinants of supply, supply function, elasticity of supply.	5
3	**Production and Cost analysis-** Theory of production- production function, law of variable proportions, laws of returns to scale, production optimization, least cost combination of inputs, isoquants. Cost concepts-explicit and implicit cost, fixed and variable cost, opportunity cost, sunkcosts, cost function, cost curves, cost and output decisions, cost estimation.	5
4	**Market structure and pricing theory-** Perfect competition, Monopoly, Monopolistic competition, Oligopoly.	5
5	**Financial statement analysis-** Balance sheet and related concepts, profit and loss statement andrelated concepts, financial ratioanalysis, cash-flow analysis, funds- flow analysis, comparative financial statement, analysisand interpretation of financial statements, capital budgeting techniques.	5
	TOTAL	**25**

BT4CE03-CT03: BASIC ELECTRONICS FOR CIVIL ENGINEERING APPLICATIONS

Credit: 2 **Max. Marks: 100 (IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	CONTENTS	Hrs.
1	**Introduction:** to objective, scope and outcome of the subject.	6
	Basic Electronics: Number systems & Their conversion used in digital electronics, Demorgan's theorem, Logic Gates, half and full adder circuits, R-S flip flop, J-K flip flop.	
	Introduction to Semiconductors, Diodes, V-I characteristics, Bipolar junction transistors (BJT) and their working, introduction to CC, CB & CE transistor configurations.	
2	**Instrumentation**: mechanical, electrical, electronic system and their calibration, Use of automatic and digital levels, electronic theodolites, total stations; Control surveys using GNSS, Total station and traversing methods (adjustment and computations of coordinates).	6
	Measurement errors: Gross error and systematic errors, absolute and relative errors, accuracy, precision, resolution and significant figures. Full-field measurements;	
3	**Data acquisition system and data processing**: analog systems, digital systems using personal computers, dynamic measurement, numerical and graphical data processing and archiving.	6
4	**Sensors & Transducers**: various types of sensors for displacement, velocity, acceleration, pressure, loads, strains, Displacement sensors, Mass &Piezoeletric, strain gauges, Temperature sensors thermocouple, flow sensors : Ultrasonic, electromagnetic, laser and thermal	6
	Sensor types characteristics: types of resolution, FOV, IFOV, PSF; Geometric and radiometric distortions, Geo-referencing, re-sampling methods; Atmospheric errors and removal; Satellite orbits and characteristics; Applications of optical and microwave remote sensing techniques in Civil Engineering.	
5	**Digital Image Processing**: Digital image, introduction to digital image processing, pre-processing, enhancement, classification, accuracy assessment.	6
	TOTAL	**30**

BT4CE04-CT04: STRENGTH OF MATERIALS

Credit: 3 **Max. Marks: 150 (IA:30, ETE:120)**

3L+0T+0P **End Term Exam: 3 Hours**

SN	CONTENTS	Hrs.
1	**Introduction:** to objective, scope and outcome of the subject **Simple Stresses and Strains in different members:** Stresses in prismatic & non prismatic members and in composite members; Thermal stresses; Stresses in composite members, Compatibility condition.	8
2	**Compound Stress:** Two dimensional stress system: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr's circle &its application. Introduction to theories of failures.	8
3	**Bending of Beams:** Bending moment, Shear force and Axial thrust diagrams for statically determinate beams subjected to various types of loads and moments, Point of Contra-flexure, relation between load, SF and BM. **Theory of simple bending**: Distribution of bending and shear stresses for simple and composite sections, Combined direct and bending stress,	8
4	**Torsion:** Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion; **Columns:** Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads; Euler's theory and its limitation, concept of effective length of columns; Rankine & Secant formulae, middle third rule, core of a section.	8
5	**Deflection of Beams:** Differential relation between load, shear force, bending moment, slope deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method and their application to statically determinate prismatic beams.	8
	TOTAL	**40**

BT4CE05-CT05: HYDRAULICS ENGINEERING

Credit: 3 **Max. Marks: 150 (IA:30, ETE:120)**

3L+0T+0P **End Term Exam: 3 Hours**

SN	CONTENTS	Hrs.
1	**Introduction:** to scope, objective and outcome of subject	8
	Dimensional Analysis & Models: Dynamical Similarity and Dimensional Homogeneity Model experiment, geometric, Kinematic and Dynamic similarity. Reynold's, froudes, Weber's, Euler and Mach numbers. Distorted river models and undistorted models, proper choice of scale ratios. Scale effect. Principle of dimensional analysis Rayleigh method, Buckingham theorem.	
2	**Turbulent flow**, Reynolds equations, Prandtl's mixing length theory, Equations of velocity distribution and friction coefficient **Boundary Layer Theory**: Concept of boundary layer, laminar and turbulent boundary layers, boundary layer thickness, von Karman integral equation, laminar sub-layer, hydro-dynamically smooth and rough boundaries, separation of flow and its control, cavitation.	8
3	**Open channel Flow** Uniform, Non-Uniform and variable flow. Resistance equations of Chezy and Manning. Section factor for uniform flow. Most Efficient rectangular, triangular and trapezoidal sections. Velocity distribution in open channels.	8
	Gradually varied flow in Prismatic channels. Specific energy of flow. Critical depth in prismatic channels. Alternate depths. Rapid, critical and sub critical Flow Mild, steep and Critical Slopes. Classification of surface curves in prismatic channels and elementary computation	
4	**Rapidly varied flow**: Hydraulic jump or standing wave in rectangular channels. Conjugate or sequent depths Losses in jump, location of jump. velocity distribution in open channels. Energy correction factor. Moment correction factor	8
	Impact of free Jets: Impact of a jet on a flat or a curved vane, moving and stationary vane. **Introduction of Hydraulic machine –** Type of pumps and turbine and its brief description. Draft tube and its principle	
	Hydrology: Definition, Hydrologic cycle, Application to Engineering problems, measurement of rain fall, rain gauge, peak flow, flood frequency method, catchment area formulae, Flood hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination, Estimation of run off.	8
	Ground Water: Aquifers and its types, Confined and unconfined aquifer, Darcy's Law, hydraulic conductivity, transmissivity, well hydraulics.	

5	**Canal Hydraulics:** Types of canals, parts of canal irrigation system, channel alignment, assessment of water requirements, estimation of channel losses, design of channels, regime and semi theoretical approaches (Kennedy's Theory, Lacey's Theory), cross section of channels, silt control in canals.	
	TOTAL	**40**

BT4CE06-CT06: BUILDING PLANNING

Credits: 2 **Max. Marks: 100 (IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	CONTENTS	Hrs.
1	**Introduction:** to scope, objective and outcome of subject	6
	Introduction: Types of buildings, criteria for location and site selection, site plan and its detail.	
	Sun Consideration : Different methods of drawing sun chart, sun shading devices, design of louvers.	
2	**Climatic and comfort Consideration**: Elements of climate, global climate, climatic zones of India, thermal comfort, biclimatic chart,	6
	Orientation: Meaning, factors affecting orientation, orientation criteria for tropical climate.	
3	**Building Bye Laws and NBC Regulations:** Objective of by-laws, regulation regarding; means of access, lines of building frontages, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation.	6
	Principles of Planning: Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc.	
4	**Vastu Shastra In Modern Building planning:** Factors considered in Vastu, site selection, orientation, planning and design of residential buildings, school/hospital	6
	Functional Design And Accommodation Requirements Of Non Residential Buildings: viz-school buildings, rest house, primary health centers, post office etc.	
5	**Services in Buildings** (A) Lighting and ventilation, doors and windows, lifts. (B) Acoustics, sound insulation and noise control. (C) Fire fighting provisions	6
	TOTAL	**30**

BT4CE07-CT07: CONCRETE TECHNOLOGY

Credit: 3 **Max. Marks: 150 (IA:30, ETE:120)**

3L+0T+0P **End Term Exam: 3 Hours**

SN	CONTENTS	Hrs.
1	**Introduction:** to objective, scope and outcome of the subject	8
	Ingredients of concrete: Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gel-space ratio etc.	
	Aggregates: types, physical properties and standard methods for their determination, including Grading of aggregates as per IS. Manufactured sand- properties and IS Specifications for use in concrete.	
2	**Concrete:** Grade of concrete, proportioning of ingredients, water content and its quality, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. Factors affecting, methods of determination.	8
	Properties of hardened concrete such as strengths, permeability, creep, shrinkage, factors influencing, Standard tests on fresh and hardened concrete as per IS code. Aggregate-cement interface, its effect on properties of concrete.	
	NDT: Introduction and their importance. Application & use of Rebound Hammer, Ultra-sonic pulse velocity meter, Rebar & Cover meter, half-cell potential meter, corrosion resistivity meter, core sampling. Interpretation of their results,	
3	**Concrete Handling in Field:** Batching, mixing, placing and transportation of concrete, equipments for material handling, various methods their suitability and precautions. Compaction of concrete: methods &equipments. Curing of concrete: various methods their suitability.	8
	Durability of concrete. Causes of deterioration, Carbonation, Tests for durability assessment	
	Admixture in concrete: Chemical and mineral admixtures, their types and uses: accelerator, retarders, water-proofing, plasticisers, super plasticizers-types, their suitability. Fly ash-properties for use in concrete, specifications of flyash as per IS 3812, and effect on properties of concrete. GGBFS, Microsilica and metakaolin- propertie, specifications and utility in concrete.	
4	Concrete mix deign (IS method)- with and without water reducing admixtures	8

	Form work: Requirements, their types. Typical formworks and shuttering/centering for Columns, beams, slabs, walls, etc. Slip and moving formwork.	
5	**Special types of concrete:** Sulphate resisting concrete, under water concreting, pumpable concrete: methods and issues in making, salient properties and applications. Concretes with tailored properties- including high performance concrete, with specific properties in fresh and hardened states, self-compacting concrete-materials, mix proportioning, test methods, use and applications with case studies.	**8**
	TOTAL	**40**

BT4CE08-CP01: MATERIAL TESTING LAB

Credit: 01 **Max. Marks: 50 (IA:20, ETE:30)**

0L+0T+2P

1. Tests on Mild steel and HYSD Bar –To determine compressive and tensile strength, yield strength, percentage elongation etc.
2. Tests on Cement and concrete cubes/ core to establish their strength
3. Hardness Test – Rockwell Hardness and Brinell Hardness
4. Impact Test – Izod and Charpy
5. Modulus of Rupture of Wooden Beam
6. Fatigue Test
7. Spring Test
8. Torsion Test

BT4CE09-CP02: HYDRAULICS ENGINEERING LAB

Credit: 01 **Max. Marks: 50 (IA:20, ETE:30)**

0L+0T+2P

1. To determine the minor losses.
2. To determine the friction factor.
3. To determine Cd of Broad crested weir.
4. To verify the momentum equation.
5. To determine the discharge of venturimeter.
6. To determine Manning's & Chezy's coefficient of roughness for the bed of a given Channel.
7. To study and plot characteristics curve of hydraulic jump.
8. To study velocity distribution in open channel flow.

BT4CE10-CP03: BUILDING DRAWING

Credit: 2 **Max. Marks: 100 (IA:40, ETE: 60)**

0L+0T+3P

1- To plan and draw working drawing of a Residential building with following detail.
   (a) Site plan
   (b) Foundation plan
   (c) Plan
   (d) Two sectional elevations
   (e) Front elevation
   (f) Furniture plan
   (g) Water supply and sanitary plan
   (h) Electric fitting plan
2- To design and draw a Primary Health Center
3- To design and draw a Primary School
4- To design and draw a Rest House
5- To design and draw a Post Office
6- To design and draw a Bank
7- To design and draw a College Library
8- To design and draw a Cinema Theatre

BT4CE11-CP04: ADVANCED SURVEYING LAB

Credit: 01 **Max. Marks: 50 (IA:20, ETE:30)**

0L+0T+2P

1. To measure the horizontal and vertical angles by Theodolite.
2. To determine the Height of an object by trigonometric leveling (Instruments in same vertical plane).
3. To determine the Height of an object by trigonometric leveling (Instruments in different vertical planes).
4. Measurement of angles, length of survey line using Total Station, finding the coordinate of station
5. To measure and adjust the angles of a braced quadrilateral.
6. To prepare the map of given area by plane tabling.
7. Measurement of area of a traverse by Total Station

BT4CE12-CP05: CONCRETE LAB

Credit: 2 **Max. Marks: 100 (IA: 40, ETE: 60)**

0L+0T+3P

1. To determine the fineness of Cement by Blaine's air permeability test.
2. To determine the flexural strength of Concrete.
3. To determine Soundness of cement by Le-chatelier apparatus.
4. To determine the specific gravity of fine aggregate (sand) by Pycnometer.
5. To determine the bulking of fine aggregate and to draw curve between water content and bulking.
6. Sieve analysis of coarse aggregates and fine aggregates.
7. To determine the workability of given concrete mix by slump test.
8. To determine the optimum dose of super plastsizers by Flow table test.
9. To design concrete mix of M-20 grade in accordance with I S 10262.
10. To design concrete mix of M-40 grade with super plasticizer in accordance with I S 10262.
11. To determine the Permeability of Concrete.
12. Study of Core cutter, UPV & Rebound Hammer equipment.