B. TECH. CIVIL ENGINEERING

Total Contact Hours = 24 **Total Marks = 900** **Total Credits = 23**

SEMESTER 3rd		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCIE1-301	Strength of Materials	3	1	0	40	60	100	4
BCIE1-302	Fluid Mechanics	3	1	0	40	60	100	4
BCIE1-303	Irrigation Engineering-I	3	1	0	40	60	100	4
BCIE1-304	Building Materials	3	1	0	40	60	100	4
BCIE1-305	Rock Mechanics & Engineering Geology	2	0	0	40	60	100	2
BSOS0-F91	Soft Skills-I	0	0	2	60	40	100	1
BCIE1-306	Fluid Mechanics Lab.	0	0	2	60	40	100	1
BCIE1-307	Strength of Materials Lab.	0	0	2	60	40	100	1
BCIE1-308	Workshop Training	-	-	-	60	40	100	2
Total	Total 5 Theory & 3 Lab. Courses	14	4	6	440	460	900	23

Total Contact Hours = 25 **Total Marks = 800** **Total Credits = 22**

SEMESTER 4th		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCIE1-409	Structural Analysis-I	3	1	0	40	60	100	4
BCIE1-410	Survey	3	1	0	40	60	100	4
BCIE1-411	Irrigation Engineering-II	3	1	0	40	60	100	4
BCIE1-412	Environmental Engineering-I	3	1	0	40	60	100	4
BCIE1-413	Construction Machinery & Works Management	3	0	0	40	60	100	3
BSOS0-F92	Soft Skills-II	0	0	2	60	40	100	1
BCIE1-414	Structural Analysis Lab.	0	0	2	60	40	100	1
BCIE1-415	Survey Lab.	0	0	2	60	40	100	1
Total	Total 5 Theory & 2 Lab. Courses	15	4	6	380	420	800	22

STRENGTH OF MATERIALS

Subject Code: BCIE1-301 **L T P C** **Contact Hrs.: 45**
3 1 0 4

Unit-I

1. Simple Stresses and Strains: Introduction, stress-strain curves for elastic materials, different types of stresses and strains, elastic limit, Hookes' Law, Young's modulus of elasticity, Bulk modulus, modulus of rigidity, Lateral strain, Elongation due to self-weight bars of tapering sections, bars of varying sections, equivalent area of composite sections, temperature stresses, relation between elastic constants. Volumetric strain.

2. Complex Stress: Introduction, rectangular block subjected to normal stresses along and across two planes, combination of normal and tangential stresses, pure shear, principal stresses and Principal planes, Mohrs Circle, Principal strains, Computation of Principal stresses from Principal strains.

Unit-II

3. Bending moment & shear force diagrams: Introduction, Types of beams, supports and loading, sign conventions for bending moments and shear forces, Shear force and Bending moment diagrams for simply supported, cantilever and overhanging beams for different types of loading. Relationship between Bending moment, Shear Force and loading Graphical method of plotting Bending Moment & Shear Force Diagrams.

4. Bending and Shear Stresses: Introduction, Assumption made in theory of simple bending, derivation of basic equation, determination of stresses in simple sections, built up sections and composite sections. (flitched Beams), Introduction to theory of unsymmetrical bending beams of uniform strength, variation of shear stress across depth of various beam sections.

Unit-III

5. Torsion: Introduction, torsion of shafts and springs, derivation of basic torsion equation, Power transmitted, sections subjected to combined bending and torsion, Principal stresses, equivalent Bending Moment & Torque, Helical spring, analysis of closed Coil helical spring.

6. Strain Energy: Introduction, Strain Energy due to axial Loads, Bending shear and Torsional stress, Impact load, strain energy due to Principal stress & strains, theories of failure.

Unit-IV

7. Deflection of Beams: Derivation of basic equation of elastic curve, deflection in beams with different end conditions and different loadings by double integration method, Macaulay's method.

8. Columns and Struts: Introduction, Euler's buckling loads for columns with different end conditions, limitations of Euler's formula, column carrying eccentric loads, laterally loaded columns, empirical formula.

Recommended Books:

1. Ferdinand P. Beer, E. Russell Johnston Jr., John T. Dewolf and David F. Mazurek, 'Mechanics of Materials (In SI Units)'.
2. D.K. Singh, 'Mechanics of Solids', Pearson Education, **2002**.

Reference Books:

1. Stephen H. Crandall, Norman C. Dahl and Thomas J. Lardner, 'An Introduction to the Mechanics of Solids', McGraw-Hill International Editions.
2. Egor P. Popov, 'Engineering Mechanics of Solids', Prentice-Hall of India.

FLUID MECHANICS

Subject Code: BCIE1-302 **L T P C** **Contact Hrs.: 45**
3 1 0 4

1. **Fluid and their Properties:** Ideal and real fluids, Continuum concept of fluid: density, specific weight and relative density, viscosity and its dependence on temperature, surface tension and capillarity, vapour pressure and cavitation, compressibility band bulk modulus, Newtonian and non-Newtonian fluids.
2. **Fluid Statics:** Concept of pressure, Pascal's law, Action of fluid pressure on plane (horizontal, vertical and inclined) submerged surface, resultant force and centre of pressure, force on a curved surface due to hydrostatic pressure, Buoyancy and flotation, stability of floating and submerged bodies, Meta centric height and its determination.
3. **Fluid Kinematics:** Classification of fluid flows, velocity and acceleration of fluid particle, local and convective acceleration, normal & tangential acceleration streamline, path line and streak line, flow rate and discharge mean velocity continuity equation in Cartesian co-ordinates, stream & velocity potential functions.
4. **Fluid Dynamics:** Euler's equation, Bernoulli's equation and steady flow energy equation, kinetic energy and momentum correction factors, flow along a curved streamline, free and forced vortex motions.
5. **Dimensional Analysis and Similitude:** Fundamental and derived units and dimensions, dimensional homogeneity, Rayleigh's and Buckingham's Pi method for dimensional analysis, dimension less number and their significance, geometric, kinematic and dynamic similarity, model studies, Flow Measurement in Manometers, Pitot tubes, Venturimeter and orifice meters, orifices, mouthpieces, notches **(Rectangular and V-notches)** and weirs **(Sharp crested Weirs)**.
6. **Laminar& Turbulent Flow:** Flow through circular section pipe, flow between parallel plates, stokes law, Transition from laminar to turbulent, Critical velocity and critical Reynolds Number Turbulent flows and flow losses in pipes, Darcy equation minor head losses in pipe fittings, hydraulic and energy gradient lines, Effects of turbulent flow in pipes.
7. **Uniform flow in open Channels:** Flow classifications, basic resistance equation for open channel flow, Chezy, Manning, Bazin and Kutter formulae, Variation of roughness coefficient, conveyance and normal depth, Velocity Distribution, Most efficient flow sections, rectangular, trapezoidal and circular.
8. **Energy principles and critical flow:** Energy and specific energy in an open channel, critical depth for rectangular and trapezoidal channels, Alternate depths, applications of specific energy to transitions and Broads crested weirs, Momentum and specific force in open channel flow, sequent depths.

Recommended Books:

1. P.N. Modi and S.M. Seth, 'Hydraulics & Fluid Mechanics', Standard Publication.
2. S. Subraminayam, 'Flow in Open Channels', Tata McGraw Hill.
3. Robert N. Fox & Alan T. Macnold, 'Introduction to Fluid Mechanics'.
4. R.K. Bansal, 'Fluid Mechanics', Laxmi Publications.
5. Jagdish Lal, 'Fluid Mechanics', Metropolitan Book Co. (P) Ltd.

IRRIGATION ENGINEERING –I

Subject Code: BCIE1-303 **L T P C** **Contact Hrs.: 45**
3 1 0 4

Unit-I

INTRODUCTION: Importance of Irrigation Engineering, purposes of Irrigation, objectives of Irrigation, Benefits of Irrigation, Advantages of various techniques of irrigation- - Furrow Irrigation, Boarder strip Irrigation, Basin Irrigation, Sprinkler Irrigation, Drip Irrigation.

METHODS OF IRRIGATION: Advantages and disadvantages of irrigation, water requirements of crops, factors affecting water requirement, consumptive use of water, water depth or delta, Duty of water, Base Period, relation between delta, duty and base period, Soil crop relation-ship and soil fertility.

Unit-II

CANAL IRRIGATION: Classifications of canals, canal alignment, Inundation canals, Bandhara irrigation, advantages and disadvantages, Silt Theories-Kennedy's theory, Lacey's theory, Drawbacks in Kennedy's & Lacey's theories, comparison of Lacey's and Kennedy's theories, Design of unlined canals based on Kennedy & Lacey's theories.

LINED CANALS: Types of lining, selection of type of lining, Economics of lining, maintenance of lined canals, silt removal, strengthening of channel banks, measurement of discharge in channels, design of lined canals, methods of providing drainage behind lining

Unit-III

LOSSES IN CANALS, WATER LOGGING AND DRAINAGE: Losses in canals Evaporation and seepage, water logging, causes and ill effects of water logging anti water logging measures. Drainage of land, classification of drains - surface and subsurface drains, Design considerations for surface drains, Advantages and maintenance of tile drains.

INVESTIGATION AND PREPARATION OF IRRIGATION PROJECTS: Classification of project, Project preparation-investigations, Design of works and drawings, concept of multi - purpose projects, Major, Medium and minor projects, planning of an irrigation project, Economics & financing of irrigation works. Documentation of project report.

Unit-IV

TUBE - WELL IRRIGATION: Types of tube wells - strainer type, cavity type and slotted type. Type of strainers, Aquifer, porosity, uniformity coefficient, specific yield & specific retention, coefficients of permeability, transmissibility and storage. Yield or discharge of a tube well, Assumptions, Theim's & Dupuit's formulae, Limitations of Theim's and Dupuit's formulae. Interference of tube wells with canal or adjoining tube-wells, causes of failure of tubewells, optimum capacity, Duty and delta of a tube well. Rehabilitation of tube well.

RIVER TRAINING WORKS: Objectives, classification of river-training works, Design of Guide Banks. Groynes or spurs - Their design and classification ISI. Recommendations of Approach embankments and afflux embankments, pitched Islands, Natural cut-offs and Artificial cut-offs and design Considerations.

Recommended Books:

1. S.K. Sharma, 'Principles & Practice of Irrigation Engg.', S. Chand, Ltd.
2. B.C. Punmia, Pande B.B. Lal, 'Irrigation & Water Power Engg.', Laxmi Publications (P) Ltd.
3. Bharat Singh, 'Fundamentals of Irrigation Engg.', Nem Chand & Bros.
4. S.R. Sahasrabudhe, 'Irrigation Engg. & Hydraulic Structure', S.K. Kataria & Sons.

5. Varshney, Gupta & Gupta, 'Irrigation Engg. & Hydraulic Structure', Nem Chand and Brothers.
6. Santosh Kumar Garg, 'Irrigation Engg. & Hydraulic Structure', Khanna Publishers.

BUILDING MATERIALS

Subject Code: BCIE1-304 **L T P C** **Contact Hrs.: 45**
3 1 0 4

Unit - I

Building Stones: General, Uses of stones, natural bed of stones, qualities of a good building stone, deterioration of stones, preservation of stones, artificial stones, common building stones of India and their uses.

Bricks: General, Composition of good brick earth, Harmful ingredients in brick earth, qualities of good bricks, tests for bricks, classification of bricks.

Timber: Definition, classification of trees, structure of a tree, felling of trees, seasoning of timber, storage of timber, market forms of timber.

Unit - II

Lime: General, some definitions calcination, Hydraulicity, setting, slacking, sources of lime, classification of limes, uses of lime, tests for lime stones.

Cement: Constituents of Cement, Manufacture of Portland cement

Concrete: Introduction, Constituents of concrete, batching of materials, Manufacturing process of cement concrete, workability and factors affecting it, Methods to determine workability, segregation and bleeding of concrete, Strength of concrete and factors affecting it.

Miscellaneous Materials: Paints, Distempering, Glass, Plastics.

Unit - III

Foundation and Walls: Definition, types of foundations, Types of walls and thickness considerations.

Brick and Stone Masonry: Terms used, Types of bonds & their merits and demerits, rubble and ashlars joints in stone masonry, cement concrete hollow blocks and their advantages and disadvantage.

Damp Proofing: Sources, causes and bad effects of dampness, preventive measures for dampness in buildings.

Unit - IV

Roofs: Terms used, Classification of roofs and roof trusses, Different roof covering materials.

Plastering and Pointing: Objects, Methods of plastering, Materials and types, Defects in plastering, special material for plastered surface, distempering white washing and colour washing.

Floors: General, Types of floors used in building & and their suitability, factors for selecting suitable floor for building.

Recommended Books:

1. Rangwala, 'Building Materials'.
2. S.P. Bindra, K.R. Arora, 'Building Construction'.
3. M.S. Shetty, 'Concrete Technology'.
4. B.C. Punmia, 'Building construction'.
5. Parbin Singh, 'Building Materials'.

6. Sushil Kumar, 'Building Construction'.

ROCK MECHANICS & ENGINEERING GEOLOGY

Subject Code: BCIE1-305 **L T P C** **Contact Hrs.: 26**
2 0 0 2

UNIT-I

1. **General Geology:** Importance of Engg. Geology applied to Civil Engg. Practices, Weathering, Definition- types and effect, Geological works of rivers, wind, glaciers as agents of erosion, transportation and deposition.
2. **Rocks & Minerals:** Minerals, their identification, igneous, sedimentary & metamorphic rocks. Classification of rocks for engineering purposes, Rock quality designation (RQD).

UNIT-II

3. **Structural Geology:** Brief idea about stratification, apparent dip, true dip, strike and in Conformities, Folds, faults & joints: definition, classification relation to engineering operations.
4. **Engineering Geology:** Geological considerations in the Engg. Projects like tunnels, highways, foundation, dams, reservoirs. Earthquake: Definition, terminology, earthquake waves, intensity, recording of earthquake.

UNIT-III

5. **Engineering properties of rocks and laboratory measurement:** Uniaxial compression test, tensile tests, permeability test, shear tests, size and shape of specimen rate of testing. Confining pressure, stress strain curves of typical rocks. Strength of intact and fissured rocks, effect of anisotropy, effect of saturation and temperature.
6. **In-situ determination of Engineering Properties of Rock masses:** Necessity of in-situ tests, uniaxial load tests in tunnels and open excavations, cable tests, flat jack test, shear test, pressure tunnel test, Simple methods of determining in situ stresses, bore hole test.

UNIT-IV

7. **Improvement in Properties of Rock Masses**: Pressure grouting for dams and tunnels, Rock reinforcement, rock bolting.

Recommended Books:

1. Richard E. Goodman, 'Introduction to Rock Mechanics'.
2. I.W. Farmar, 'Engineering Behaviour of Rocks'.
3. C. Jaager, 'Rock Mechanics and Engineering'.
4. Jaager and Cook, 'Fundamentals of Rock Mechanics'.
5. D.S. Arora, 'Engineering Geology'.
6. Parbin Singh, 'Engineering Geology'.
7. B.P. Verma, 'Rock Mechanics for Engineering'.

FLUID MECHANICS LAB.

Subject Code: BCIEI-306 **L T P C**
0 0 2 1

1. To determine the meta-centric height of a floating vessel under loaded and unloaded conditions.

2. To study the flow through a variable area duct and verify Bernoulii's energy equation.
3. To determine the coefficient of discharge for an obstruction flow meter (venturimeter/orifice meter)
4. To determine the discharge coefficient for a Vee notch or rectangular notch.
5. To determine the coefficient of discharge for Broad crested weir.
6. To determine the hydraulic coefficients for flow through an orifice.
7. To determine the friction coefficient for pipes of different diameter.
8. To determine the head loss in a pipe line due to sudden expansion/sudden contraction/ bend.
9. To determine the velocity distribution for pipe line flow with a pitot static probe.

Recommended Books:

1. John J. Bloomer, 'Practical Fluid Mechanics for Engineering Applications (Mechanical Engineering), Marcel Dekker.
2. S. Sarabjit Singh, 'Fluid Mechanics Practical Manual'.
3. Baljit Kapoor, 'Fluid Mechanics Manual'.

STRENGTH OF MATERIAL LAB.

Subject Code: BCIE1-307 **L T P C**
0 0 2 1

Experiments on **Material Behaviour:** Tests for Impact, Hardness, Torsion, Stiffness, Tensile Strength, Bending and Compression tests, Columns & Struts.

1. To determine Tensile Strength of Mild Steel.
2. To determine Torsional Strength of Mild Steel and Cast Iron.
3. To determine Impact Strength of Mild Steel – Izod's and Charpy tests.
4. To determine Brinell and Vicker's Hardness numbers of Mild Steel.
5. To determine the Rockwell Hardness number of metals.
6. To determine the Fatigue Strength of Mild Steel.
7. To determine experimentally the value of modulus of elasticity of the beam material using deflections formula for simply supported and cantilever beams.
8. To study the behavior of the given material on UTM.
9. Study of behavior of columns and struts with different end conditions.

Recommended Books:

1. Timoshenko and D.H. Young, 'Elements of Strength of Materials', Van Nostrand Reinhold Company, New York.
2. Seely and Sindh, 'Advanced Mechanics of Materials'.
3. S. Ramamarutham, 'Strength of Materials', Dhanpat Rai and Sons.
4. IS: 1608-1972-Method for Testing of Steel Products.
5. IS: 1521-1972-Method for Tensile Testing of Steel Wire.
6. IS: 1717-1971-Method for Simple Torsion Testing of Steel Wire.
7. IS: 524-1969-Method of Test for determining Shear Strength of Mild Steel.
8. IS: 1598-1960-Izod Impact Test for Steel.
9. IS: 1499-1959-Method for Charpy Impact Test (U-Notch) for Steel.
10. IS; 1500-1668-Method for Brinell Hardness Test for Steel.
11. IS: 1586-1968-Method for Rockwell Hardness Test for Steel.

12. IS: 1599-1960-Method for Bend Test for Steel Products other than Sheet, Strip, Wire and Tube.
13. IS: 5619-1970-Indian Standard Recommendations for Fatigue Testing of Metals.
14. Manual on Fatigue Testing, A.S.T.M. Special Technical Publication No. 91.
15. IS: 5069-1969- Indian Standard on Glossary of terms relating to methods of mechanical testing of metals.

STRUCTURAL ANALYSIS-I

Subject Code: BCIE1-409 **L T P C** **Contact Hrs.: 45**
3 1 0 4

Unit-I

1. Deflection of Beams: Review of Double Integration Method and Macaulay's Method, Moment Area Method, Conjugate Beam Method, Unit Load Method, Energy Methods, Maxwell's reciprocal theorem.

2. Thin Cylinders and Spheres: Introduction, stresses and strains in thin cylinders and spherical shell, volumetric change, wire wound thin cylinders, thin vessels subjected to internal pressure.

Unit-II

3. Analysis of determinate Trusses: Introduction, determination of forces in member of trusses by method of joints, method of sections, Tension Coefficient Method, Deflection of Joints of plane frames by castigliano's first theorem and unit load method, Effect of Lack of Fit & Temperature Change.

4. Analysis of Dams, chimneys and Retaining Walls: Introduction, limit of eccentricity for no tension in the section, core of the section, middle third rule, wind pressure on chimneys.

Unit-III

5. Simple Cable & Arch Structures: Introduction, shape of a loaded cable, cable carrying point loads and UDL, cables with ends at different level, cable subjected to temperature stresses, Analysis of Cables, Analysis of three hinged (Parabolic and Circular) Arches for Horizontal Thrust, Bending Moment, Normal Thrust, and Radial Shear.

6. Suspension Bridges: Introduction, Analysis of suspension bridges with two hinged and three hinged stiffening girders, Temperature Stresses in Three Hinged and Two Hinged Stiffening Girders.

Unit-IV

7. Rolling Loads: Introduction to rolling loads and influence lines, Determination of shear force, bending moment at a section and absolute shear force and bending moment due to single point load, uniformly distributed load, several point loads etc.

8. Influence Lines: Construction of Influence lines for reaction, shear forces and bending moment for beams, influence lines for girders with floor beams, Influence lines for forces in members of frames. Influence lines for Three Hinged Arches & Stiffening Girders.

Recommended Book:

1. C.S. Reddy, 'Basic Structural Analysis'.
2. Vazirani & Ratwani, 'Analysis of Structures', Vol- I, II.
3. C.K.Wang, 'Intermediate Structural Analysis'.

SURVEY

Subject Code: BCIEI-410 **L T P C** **Contact Hrs.: 45**
3 1 0 4

Unit - I

Definition, principles of surveying, different types of surveys, topographical map, scale of map. Measurement of distances with chain and tape, direct & indirect ranging, offsets.
Instruments used in traversing, bearings, meridians, declination, dip of magnetic needle, bearing of lines from included angles, local attraction, closing error and its removal.

Unit-II

Principle of plane table survey, setting up the plane table and methods of plane tabling.
Setting up a dumpy level, booking and reducing the levels by rise & fall method and height of instrument method, correction due to curvature and refraction, characteristics of contours, methods of contouring, uses of contour maps.

Unit – III

Temporary and permanent adjustments of theodolite, measurement of horizontal and vertical angles, closed & open traverse, consecutive and independent co-ordinates, advantages and disadvantages of traversing, Latitudes and Departures, closing error, Bowditch & Transit Rules, Gales traverse table, Different cases of omitted measurements.
Determination of tachometer constants, Measurement of horizontal & vertical distances with tachometer.

Unit – IV

Selection of stations and base line for geodetic survey, corrections for base line, satellite station and reduction to centre. Elements of curves, different methods of setting out of curves, transition curve.

Recommended Books:

1. B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, 'Surveying', Vol. I, II, Laxmi Publications, **2005.**
2. R. Agor, 'Surveying', Khanna Publishers, **1982.**
3. S.S. Bhavikatti, 'Surveying & Levelling Vol. I, II, **2009.**
4. Narinder Singh, 'Surveying', Tata McGraw Hill.
5. N.N. Basak, 'Surveying and leveling', Tata McGraw Hill, New Delhi, **2000.**

IRRIGATION ENGINEERING –II

Subject Code: BCIEI-411 **L T P C** **Contact Hrs.: 45**
3 1 0 4

Unit-I

Head Works: Types of head works, Functions and investigations of a diversion head work: component parts of a diversion head work and their design considerations, silt control devices.
Theories of Seepage: Seepage force and exit gradient, assumptions and salient features of Bligh's Creep theory, Limitations of Bligh's Creep theory, salient features of Lane's weighted Creep theory and Khosla's theory, Comparison of Bligh's Creep theory and Khosla's theory, Determination of uplift pressures and floor thickness.

Unit-II

Design of Weirs: Weirs versus barrage, types of weirs, main components of weir, causes of failure of weir and design considerations with respect to surface flow, hydraulic jump and seepage flow. Design of barrage or weir.

Energy Dissipation Devices: Use of hydraulic jump in energy dissipation, Factors affecting design, Types of energy dissipaters and their hydraulic design.

Unit-III

Canal Regulators: Offtake alignment, cross- regulators – their functions and design, Distributary head regulators, their design, canal escape.

Canal Falls: Necessity and location, types of falls and their description, selection of type of falls, Principles of design, Design of Sarda type, straight glacis and Inglis or baffle wall falls and level crossing**.**

Unit-IV

Cross-Drainage works: Definitions, choice of type, Hydraulic design consideration, Aqueducts their types and design, siphon aqueducts – their types and design considerations, super passages, canal siphons

Canal Out-lets: Essential requirements, classifications, criteria for outlet behaviors, flexibility, proportionality, sensitivity, sensitiveness, etc. Details and design of nonmodular, semi-modular and modular outlets.

Recommended Books:

1. Santosh Kumar Garg, 'Irrigation Engineering & Hydraulic Structure', Khanna Publishers.
2. R.K. Sharma, 'Design of Irrigation Structures', Oxford IBH Publishers.
3. S.R. Sahasrabudhe, 'Irrigation Engineering and Hydraulics Structures', Katson Publishing.
4. K.B. Khushlani, 'Irrigation Practice and Design', Vol. I to VII, Oxford IBH Publishers.
5. P.N. Modi, 'Irrigation with Resources and with Power Engineering', Standard Book House.
6. Ivan E. Houk, 'Irrigation Engineering', Vol. I, II, John Wiley and Sons.

ENVIRONMENTAL ENGINEERING-I

Subject Code: BCIEI-412 **L T P C** **Contact Hrs.: 45**

3 1 0 4

Unit – I

Public Water Supply: Beneficial uses of water, water demand, per capita demand, variation in demand, causes detection and prevention of wastage of water, population forecasting, and water demand for firefighting, population forecasting and water demand estimation.

Water sources and development: Surface and ground water sources; Selection and development of sources; Assessment of potential; Flow measurement in closed pipes, intakes and transmission systems.

Unit – II

Pumps and Pumping Stations: Types of pumps and their characteristics and efficiencies; Pump operating curves and selection of pumps; pumping stations.

Quality and testing of Water: Impurities in water, sampling of water, physical, chemical and bacteriological water quality parameters, drinking water quality standards and criteria.

Water treatment: Water treatment schemes; Basic principles of water treatment; Design of plain sedimentation, coagulation and flocculation, filtration – slow, rapid and pressure; Disinfection

units; Fundamentals of water softening, fluoridation and defluoridation, and water desalination and demineralization, taste and odour removal.

Unit – III

Transportation of Water: Pipes for transporting water and their design, water distribution systems and appurtenances; Water supply network design and design of balancing and service reservoirs; operation and maintenance of water supply systems.

Rural water supply: Principles, selection of source, rain water harvesting, quantitative requirements, low cost treatment techniques.

Unit – IV

Miscellaneous Methods of Water Treatment: Aerial colour, odors & Taster from water, control, removal of iron & manganese from water softening processes, base exchange process, swimming pool water treatment.

Recommended Books:

1. B.C. Punmia, Ashok Jain, Arun Jain, 'Water Supply Engineering - Environmental Engineering', Vol. I, Laxmi Publications, New Delhi.
2. Arcadio P. Sincero and Gregoria P. Sincero, 'Environmental Engineering - A Design Approach', Prentice Hall of India, New Delhi.
3. Howard S. Peavy, Donald R. Rowe & George Tchobanoglous, 'Environmental Engineering', McGraw Hill, International Edn.
4. S.K. Garg, 'Water Supply Engineering- Environmental Engineering', Vol. – I, Khanna Publishers, Delhi.
5. 'Water Supply and Sewerage', E.W. Steel, McGhee, J. Terence, McGraw Hill.

CONSTRUCTION MACHINERY & WORKS MANAGEMENT

Subject Code: BCIE1-413 **L T P C** **Contact Hrs.: 45**
3 1 0 4

UNIT-I

1. INTRODUCTION: Need for project planning & management, time, activity & event, bar chart, Milestone chart, uses & draw backs.

2. PERT TECHNOLOGY: Construction of PERT network, time estimates, network analysis, forward pass & backward pass, slack, critical path, data reduction, suitability of PERT for research project, numerical problems.

UNIT-II

3. CPM TECHNOLOGY: Definitions, network construction, critical path, fundamental rules, determination of project schedule, activity time estimates, float types, their significance in project control, numerical problems.

UNIT-III

4. COST ANALYSIS AND CONTRACT: Type of costs, cost time relationships, cost slopes, conducting a crash programme, determining the minimum total cost of project, numerical problems. updating a project, when to update, time grid diagram, resource scheduling. planning of different components of civil engineering projects such as a house, workshop, dam, tunnel.

UNIT-IV

5. CONSTRUCTION EQUIPMENT AND MACHINERY: Tractors, bull dozers, rippers, scrappers, power shovels, dragline, hoes. Line diagram of each, sizes, output, uses, factors

affecting selection of each equipment, economic life of equipment, maintenance and repair cost. Hoisting & Transporting Equipment: Hosts, Winches, Cranes, Belt conveyors, Ropeways, trucks & Wagons, Basic introduction to modern constructional equipment.

RECOMMENDED BOOKS:

1. R.L. Peurifoy, 'Construction Planning and Equipment', Tata McGraw Hill, New Delhi.
2. L.S. Srinath, 'PERT and CPM', East West Press.
3. Wiest & Levy, 'Management Guide to PERT & CPM', Prentice Hall.
4. Mahesh Verma, 'Construction Equipment & Planning and Application', Artec Publication.
5. U.K. Shrivastava, 'Construction Planning and Management', Galgotia Publications Pvt. Ltd.

STRUCTURAL ANALYSIS LAB.

Subject Code: BCIE1-414 **L T P C**
0 0 2 1

Experimental Work:

1. Deflection of a simply supported beam and verification of Clark-Maxwell's theorem.
2. To determine the Flexural Rigidity of a given beam.
3. To verify the Moment- area theorem for slope and deflection of a given beam.
4. To determine the Carry Over Factor of a prismatic beam with far end fixed.
5. Experiment on three-hinged arch.
6. Experiment on two-hinged arch.
7. Deflection of a statically determinate pin jointed truss.
8. Forces in members of a Redundant frame.
9. Experiment on curved beams.
10. Unsymmetrical bending of a cantilever beam.

SURVEY LAB.

Subject Code: BCIEI-415 **L T P C**
0 0 2 1

1. Measurement of distance, ranging a line.
2. Measurement of bearing and angles with compass, adjustment of traverse by graphical method.
3. Different methods of leveling, height of instrument, rise & fall methods.
4. Measurement of horizontal and vertical angle by theodolite, plotting of traverse.
5. Determination of tachometric constants and determination of reduced levels by tachometric observations.
6. Plane table survey, different methods of plotting, two point & three-point problem.
7. Measurement of Base Line after applying tape corrections.
8. Setting out a transition curve. Setting out of circular curves in the field using different methods.