# Chhattisgarh Swami Vivekanand Technical University, Bhilai

## SCHEME OF TEACHING & EXAMINATION

### B.E. VI SEMESTER CIVIL ENGINEERING

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Board of Study</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Periods per Week</th>
<th>Scheme of Examination</th>
<th>Total Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>L</td>
<td>T</td>
<td>P</td>
<td>ESE</td>
</tr>
<tr>
<td>1</td>
<td>Civil Engg.</td>
<td>320611 (20)</td>
<td>Structural Engineering Design - II</td>
<td>4</td>
<td>1</td>
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<td>80</td>
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<tr>
<td>2</td>
<td>Civil Engg.</td>
<td>320612 (20)</td>
<td>Geotech Engineering - II</td>
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<td>-</td>
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<td>3</td>
<td>Civil Engg.</td>
<td>320613 (20)</td>
<td>Environmental Engineering - I</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>80</td>
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<td>4</td>
<td>Civil Engg.</td>
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<td>Transportation Engineering - II</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>80</td>
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<td>5</td>
<td>Civil Engg.</td>
<td>320615 (20)</td>
<td>Construction Planning and Management</td>
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<td>-</td>
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<td>6</td>
<td>Civil Engg.</td>
<td>320621 (20)</td>
<td>Structural Engineering Lab</td>
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<td>-</td>
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<td>7</td>
<td>Civil Engg.</td>
<td>320622 (20)</td>
<td>Geotech Engineering - II Lab</td>
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<td>-</td>
<td>-</td>
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<td>8</td>
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<td>Environmental Engineering - I Lab</td>
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<td>-</td>
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<td>Civil Engg.</td>
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<td>Concrete Lab</td>
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<tr>
<td>10</td>
<td>Civil Engg.</td>
<td>300625 (36)</td>
<td>Managerial Skills</td>
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<td>40</td>
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<td>Library</td>
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</table>

**Total**: 19 6 15 640 120 240 1000 34

- **L**: Lecture
- **T**: Tutorial
- **ESE**: End Semester Exam
- **P**: Practical
- **CT**: Class Test
- **TA**: Teacher’s Assessment

**Note**: Industrial Training of twelve weeks is mandatory for B.E. students. It is to be completed in two equal parts. The first part must have been completed in summer after IV sem. The second part to be completed during summer after VI sem. after which students have to submit a training report which will be evaluated by college teachers during B.E. VII sem.

## Table - I

### Professional Elective – I

<table>
<thead>
<tr>
<th>Materials Group</th>
<th>S.No.</th>
<th>Board of Study</th>
<th>Subject Code</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.</td>
<td>Civil Engg.</td>
<td>320631 (20)</td>
<td>Modern Construction Materials</td>
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<td>2.</td>
<td>Civil Engg.</td>
<td>320632 (20)</td>
<td>Composite Materials</td>
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<td>3.</td>
<td>Civil Engg.</td>
<td>320633 (20)</td>
<td>Advanced Concrete Technology</td>
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<td>4.</td>
<td>Civil Engg.</td>
<td>320634 (20)</td>
<td>Advanced Strength of Materials</td>
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<td>Surveying Group</td>
<td>5.</td>
<td>Civil Engg.</td>
<td>320635 (20)</td>
<td>Modern Surveying Techniques</td>
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<td></td>
<td>6.</td>
<td>Civil Engg.</td>
<td>320636 (20)</td>
<td>Remote Sensing and its Applications</td>
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<td>7.</td>
<td>Civil Engg.</td>
<td>320637 (20)</td>
<td>GIS and its Applications</td>
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<td>Hydraulics Group</td>
<td>8.</td>
<td>Civil Engg.</td>
<td>320638 (20)</td>
<td>Computational Hydraulics</td>
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<td></td>
<td>9.</td>
<td>Civil Engg.</td>
<td>320639 (20)</td>
<td>Instrumentation in Fluid Mechanics</td>
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<td></td>
<td>10.</td>
<td>Civil Engg.</td>
<td>320640 (20)</td>
<td>Water Power Engineering</td>
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</table>

**Note (1)** – 1/4th of total strength of students subject to minimum of twenty students is required to offer an elective in the college in a particular academic session.

**Note (2)** – Choice of elective course once made for an examination cannot be changed in future examinations.
Unit 1 Materials and Methods of Analysis
Introduction to working stress method and Limit state method of design of steel structures, types of loads and load combinations.

Unit 2 Fasteners and Tension Members
Riveted, Bolted and Welded Connections, Strength, Efficiency and Design of Joints, Advantages and Disadvantages of Welded Joints, Design of Fillet and Butt Welds, Design of Eccentric Connections, Introduction to high strength friction grip bolts.
Net Sectional Area, Design of Axially Loaded Tension Member, Steel Angles under tension

Unit 3 Compression Members and Column Bases
Modes of Failure of a Column, Buckling Failure: Euler’s Theory, Effective Length, Slenderness Ratio, Design Formula: I.S. Code Formula, Design of Compression Members, Design of Built-Up Compression Members: Laced and Battened Columns, Slab and Gusseted Bases.

Unit 4 Beams
Design Procedure, laterally supported and laterally unsupported beams, Built-Up Sections, Web Crippling, Web Buckling, Curtailment of Flange Plates

Unit 5 Member Subjected To Combined Forces
Design of Member Subjected to combined forces, Eccentricity of Load, Interaction Formulae. Eccentrically Loaded Base Plates.

Name of Text Books:
Design of Steel Structures – Arya, A.S., Ajmani, J.I. (Nem Chand & Bros., Roorkee, U.P.)
Design of Steel Structures – Punmia, Jain & Jain (Laxmi Publications)

Name of Reference Books:
I.S. code of practice on steel structures
Design of Steel Structures – Duggal S.K. (Tata McGraw Hill)
Design of Steel Structures (Vol. - I & II) – Ram Chandra (Standard Book House, New Delhi)
Design of Steel Structures – Dayaratnam (Wheeler Publishing, New Delhi)
Design of Steel Structures – E.H.Gaylord and C.N. Gaylord (McGraw Hill, New York)
Steel Structures: Design and Behaviour – C.G.Salmon and J.E.Johnson (Harper and Row, New York)
Unit 1 STABILITY OF SLOPES
Embankment slopes, examples of embankment, road and earth dams, stability analysis for finite and infinite slopes concept of factor of safety, friction circle method, method of slices, Bishop’s simplified method, limiting values of factor of safety; critical conditions for the stability of earth dams.

Unit 2 Earth Pressure
Earth Pressure at rest, active and passive earth pressure, computations using Rankine’s and Coulomb’s earth pressure theories, Rabhann’s and Culamaan’s graphical method, additional earth pressure due to surcharge and earthquake loading.

Unit 3 SHALLOW FOUNDATIONS AND SETTLEMENTS
Common types of foundations with examples, brief illustration of situations where each one of them is adopted, basis for design, review of major soil parameters used in proportioning of shallow foundations, types and their selection bearing capacity, various method of determination of bearing capacity, computation of bearing capacity in cohesion less and cohesive soils, effect of various factors on bearing capacity, use of field test data, limits of settlement, differential and permissible settlement of footing, rafts on sand using penetration and load test data, estimation of settlement of footing for rigid and flexible, proportioning of footings.

Unit 4 WELL AND PILE FOUNDATIONS
Various types of caissons Situations where adopted, elements of wells, types, method of construction, tilt and shift, remedial measures, bearing capacity and settlement, Terzaghi’s lateral stability analysis, Pile Foundation, their types, criteria of selection of piles, outline of steps involved in proportioning, bearing capacity and settlement of single and group of piles, design of pile groups and settlement of pile group in clay, negative skin friction.

Unit 5 MACHINE FOUNDATION, CONTAMINATED AND EXPANSIVE SOIL
Introduction of machine foundation, types of machines and their foundations, Design criteria, Field methods of determining design Parameters, block vibration test, response of block foundations under vertical vibrations, I.S. code recommendations and foundation on expansive soil, identification of expansive soil, contaminated soil, problems associated with contaminated and expansive soil, design consideration of foundation on expansive soil, CNS soils.

Name of Text Books:
Soil Mechanics and Foundation Engineering – B.C. Punmia (Laxmi Publication)
Soil Engineering in Theory and Practice (Vol-II) – Alam Singh (Asia Publishing House, New Delhi)

Name of Reference Books:
Foundation Analysis and Designing – J.E. Bowles (McGraw Hill, New Delhi)
Physical Methods of Soil Characterisation – J. Behari (Narosa Publishing Hall, New Delhi)
Unit 1 INTRODUCTION
Necessity and importance of water supply schemes.
Water demand
Classification of water demands, Estimation of quantity of water required by a town, per capita demand, factors affecting per capita demand, design period and population forecasting, variation in water demand.
Sources of water supply
Surface sources and underground sources, Intake works, site selection, type of intake works.

Unit 2 QUALITY OF WATER
Common impurities, physical, chemical and biological characteristics of water, water quality standards for municipal and domestic supplies.
Water Processing
Object of water processing, flow diagrams of typical ground water system and surface water systems.
Sedimentation
Theory of sedimentation, sedimentation tanks and its types, design parameters related with sedimentation tanks, sedimentation with coagulations, coagulants and coagulant aids, Jar test for determining coagulant dosage.

Unit 3 Filtration
Theory of filtration, slow sand and rapid sand filters, Construction and operation.
Disinfection
Methods of disinfection, Chlorination, Types of chlorination, Break Point chlorination.

Unit 4 Softening
Methods of Softening, Iron Removal, Fluoridisation.
Distribution System
Methods of distribution, layout of distribution system, methods of analysis, pressure in the distribution system, distribution reservoirs, functions and its types, storage capacity of distribution reservoir.

Unit 5 Air Pollution
Introduction, causes, sources, characteristics, effects of air pollution on plants, humans, animals and materials and atmosphere, air pollution control methods and equipment.
Noise Pollution
Definition, sources, effects of noise pollution on humans, animals and non-living things, methods of noise control.

Name of Text Books:
Water Supply Engineering – B.C. Punmia (Laxmi Publication, New Delhi)

Name of Reference Books:
Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
Environmental Science and Engineering – Henry and Heinke (Pearson Education)
Unit 1
Historical development of railway in India. Merits of rail transportation, gauges and gauge problems, railway track cross sections, coning of wheels, rail cross sections, weight of rail, length of rail, wear of rails, Creep of rails, rail joints and welding of rails, advantages of welding.

Unit 2
Sleepers
Requirements, various types, spacing and density, rail fixtures, fastenings.

Ballast
Requirements, various types.

Geometrics
Grading, cant and cant deficiency, transition curves, widening of gauges on curves.

Unit 3
Points and Crossings, design of turnouts, various types of track junctions, signaling and interlocking, classification of signals, control of movements of trains, interlocking of signal and points.

Unit 4
Tunnel Engineering
Consideration in tunneling shape and size, methods of tunnel, constructions, tunneling in soft soil and rocks, lining of tunnels, ventilations, drainage of tunnels.

Unit 5
Harbour Engineering
Harbour layout, harbour works, break water, jetties, wharves, piers and berthing facilities, navigational aids, port facilities, docks, transit sheds and ware houses, general layout of a port.

Name of Text Books:
  Railway Engineering – S.C. Saxena & Arora (Dhanpat Rai Publications)
  Tunneling Engineering – S.C. Saxena (Dhanpat Rai Publications)
  Railway Engineering – Rangawala (Charotar Publications)

Name of Reference Books:
  Harbour Engineering – Srinivas (--------)
  Tunnel and Harbour – Seetharaman S. (Umesh Publications)
Unit 1
Introduction
Objectives and functions of project management, project feasibility reports, Planning for construction projects,
Cost control in construction-importance, objectives of cost control, cost control systems.
Economics of Project management
Economic analysis of engineering projects, economic studies, sensitivity analysis, Introduction to
Management Information System (MIS)- definition, outline of MIS.
Unit 2
Scheduling
Scheduling Job layout and Line of balance, project management through networking PERT, CPM
Unit 3
Safety and Quality Control
Importance, causes of Accidents safety measures, responsibility for safety, safety benefits to various parties.
Quality control in construction: Importance, Elements of quality, Quality Assurance Techniques, Quality
Control Circles.
Total Quality Management in construction, Introduction, Elements of TQM, Approaches to total quality,
difference between traditional management and TQM, Applications and constants of TQM in construction
process.
Unit 4
Economics of Project management
Economic analysis of engineering projects, economic studies, sensitivity analysis, Introduction to
Management Information System (MIS)- definition, outline of MIS.
Unit 5
Construction Equipments and Management
Classification of construction equipments, earth moving equipments, hauling equipments, hoisting
equipments, aggregate and concrete production equipments, pile driving equipments, time and motion
studies, waiting line theory, Need for mechanisation, financing aspects, factors affecting selection of
construction equipments, cost of owning and operating the construction equipment, role of operation research
in equipment management, equipment maintenance.
Name of Text Books:
Construction Engineering and Management – S. Seetharaman (Umesh Publications, New delhi, 1997)
Construction Management and Planning – Sen Gupta & Guha (Tata McGraw Hill)
Name of Reference Books:
PERT & CPM – Sreenath, I.S. (East West Press, New Delhi, 1975)
Delhi, 2002)
Construction Planning and Management – Gahlot & Dhir (New Age Publisher)
Unit 1
Concretes: High strength and High performance concrete-Fiber Reinforced concrete

Unit 2
Metals: New Alloy steels-Aluminium and its products-Other alloys

Unit 3
Composites: Plastics-Reinforced polymers-FRP-Celular cores

Unit 4
Other Materials: Water proofing compounds-Non -weathering Materials-Flooring and Facade Materials

Unit 5
Smart and Intelligent Materials: Brief outline and uses

Name of Text Books:

Name of Reference Books:

High Performance Concrete – Aitkens (McGraw Hill, 1999)
Unit 1
Introduction, Historical background, Technological Applications, Composites – various reinforcement and matrix materials, Classification of composites.

Unit 2
Forms of fibre reinforcement, Comparisons of composites with R.C.C. and metals, Strength and stiffness properties, Effective moduli.

Unit 3
Fibre reinforced composite materials, Manufacturing Technique, Cost and Weight advantages.

Unit 4
Behaviour of uni-directional, cross-ply, angle-ply and other composites-strength and stiffness, anisotropy, Generalized Hooks law.
Laminates-Laminated Plates, Analysis, Strength and design with composites, Fibre reinforced Pressure vessels.

Unit 5
Laminates-Laminated Plates, Analysis, Strength and design with composites, Fibre reinforced Pressure vessels.

Name of Text Books:

Name of Reference Books:
Introduction to Design and Analysis with Advanced Composite Materials – Stephen R. Swanson (Prentice Hall, New Jersey, 1997)
Unit 1
Concrete Making Materials
Aggregates classification, IS Specifications, Properties, Grading, Methods of combining aggregates, specified gradings, Testing of aggregates, Types of Fibers.
Cement, Grade of cement, Chemical composition, Testing of concrete, Hydration of cement, Structure of hydrated cement, Special cements

Unit 2
Properties of Concrete and Admixtures
Water Chemical admixtures, Mineral admixture.

Unit 3
Concrete Mix Design
Principles of concrete mix design, Methods of concrete mix design, Testing of concrete.

Unit 4
Special Concrete

Unit 5
Concreting Methods
Process of manufacturing of concrete, methods of transportation, placing and curing - Extreme weather concreting, special concreting methods, Vacuum dewatering - underwater concrete, special from work.

Name of Text Books:
Concrete Technology – Shetty M.S., (S.Chand and Company Ltd. Delhi)

Name of Reference Books:
Light Weight Concrete Academic Kiado – Rudhani G. (Publishing Home of Hungarian Academy of Sciences, 1963)
Concrete Technology – M.L. Gambhir (Tata McGraw Hill)
Concrete Technology – R.S. Varshney (Oxford, IBH Publishers)
Unit 1
Stresses and Strains in three dimensions, Theories of failure.

Unit 2
Beams on elastic foundations, infinite, semi-infinite and finite beams.

Unit 3
Bending of curved beams in the plane of loading-crane hooks and chain links.

Unit 4
Bending of curved beam out of its initial plane, Saint Venant’s equations and equations of equilibrium.
Bending of circular beams subjected to symmetric loading.

Unit 5
Torsion of non-circular members, St. Venant’s theory, Torsional stresses in elliptical, triangular shafts.
Approximate solutions for rectangular section, Membrane analogy, Torsion of hollow sections, Torsional stresses in thin walled open and closed sections, Plastic, yielding of circular shafts.
Bending of thin plates, Assumptions of plate theory, GDE for deflection of plates, Boundary conditions.
Solutions for rectangular plates, Navier’s and Levy’s solutions, circular plates, Membrane theory of shells of revolution and cylindrical shells.

Name of Text Books:

Unit 1
Modern Surveying Equipment

Unit 2
Global Positioning System

Unit 3
Geographic Information System
Geographic Information System – data requirement and database creation; Use of field data, maps, aerial and satellite data; Advantages of GIS.

Unit 4
GIS Analysis
Types of GIS analysis, map topology, map feature elements, queries, features in a topographic base map, base map accuracy standards.

Unit 5
Surveying Mapping through Software
Introduction of ARC Info, ARC View, ARC Gms, Intergraph, MGE, Modular GIS Environment, Map Info and Geomedia web map, etc.

Name of Text Books:
Surveying (Vol - I, II & III) – Arora, K.R. (Standard Book House, Delhi, 1993)
Elements of Photogrammetry – Wolf, P.R. (McGraw Hill Book Company, New Delhi.)

Name of Reference Books:
Unit 1
Remote Sensing
Introduction and definition of Remote Sensing terminology, Photogrammetry, Types of Photographs, Geometry of Photographs, Stereophotogrammetry.

Unit 2
Image Processing Systems
Principles of interpretation of aerial and satellite images, equipments and aids required for interpretation ground truth collection and verification, advantages of multidate and multiband images.

Unit 3
Initial Statistics Extraction
Digital Satellite data products and their characteristics, Histogram and its utility, Enhancement, Different methods of digital satellite data interpretation.

Unit 4
Radiometric and Geometric Correction in Image Processing
Introduction, radiometric correction of remotely sensed data, correction for sensor system, detector error, spatial interolation using coordinate transformations, intensity interpolation.

Unit 5
Micro Wave Remote Sensing
Introduction, the radar principle, radar removal advantages, synthetic aperture radar (SAR), interpreting SAR images.

Name of Text Books:

Name of Reference Books:
Unit 1

Basic Concept of GIS
Introduction, Information systems, spatial and non-spatial information, Geographical concepts and terminology, Advantages of GIS, Basic components of GIS, Commercially available GIS hardware and software, organisation of data in GIS.

Unit 2

GIS Data
Input data, Field data, Statistical data, Maps, Aerial photographs, Satellite data, Points, lines and areas features, Vector and Raster data, Advantages and Disadvantages, Data entry through keyboard, digitizers and scanners, Digital data, GIS data formats and standards.

Unit 3

Data Management
Data Management, Data Base Management System (DBMS), Various data Models, Run – length encoding, Quadtrees, Data Analysis – Data layers, analysis of spatial and non-spatial data, Data overlay and modelling, smart features of DBMS.

Unit 4

Applications of GIS
Applications of GIS in Map Revision, Landuse, Agriculture, Forestry, Archaeology, Municipal, Geology, Water Resources, Soil Erosion, Land suitability analysis, Change detection.

Unit 5

Case Study
A case study in GIS implementation, the consultant, the client, the initial applications, types of GIS analysis used for case study.

Name of Text Books:

Name of Reference Books:
Unit 1
Introduction, significance of computational hydraulics, discrete forms of the laws of construction of mass, momentum and energy, examples of free surface flows.

Unit 2
Continuous forms of the conservation laws, lateral inflow’s 1-D expansions and contractions, homogeneous and stratified fluid flows.

Unit 3
Method of characteristics – Characteristics and invariants, regions of state, computation of hydraulic jump, indeterminary conditions, the linearised method of characteristics.

Unit 4

Unit 5
Numerical methods – Finite difference method with example 1-D horizontal flow.

Name of Text Books:

Name of Reference Books:
- Computational Hydraulics – M.B. Abbott (Pitman Publication Company)
- Engineering Applications of Computational Hydraulics – M.B. Abbott & J.A. Gunge (Pitman Books Ltd.)
- Computational Hydraulics – Abbot, M.B. & A.W. Minns, 1994 (Ashgate Publication)
Unit 1
Introduction
Need for instrumentation in various fluid flow processes, types of measurements: pressure, velocity, temperature, discharge, water levels, force, shear stress, basic principles of transducers, microprocessors and data-acquisition systems, calibration of instruments.

Unit 2
Pressure Measurements
Manometers, capacitance and inductance transducers, non-contact probes.

Unit 3
Velocity measurements
Pitot tube, Pitsphere and Pitocylinder, current meter, Hot wire anemometer, Laser-Doppler anemometer.

Unit 4
Discharge Measurement
Venturimeter, orifice meter, bend meter, electromagnetic and ultrasonic flow meters, rotameer, weirs and flumes, tracer techniques, Hot wire anemometer and thermistors.

Unit 5
Other Measurements
Water level recorders direct and indirect measurement of shear stress, force transducers, use of tracers in dispersion and diffusion studies.

Name of Text Books:

Name of Reference Books:
Unit 1
Introduction
Water Power, its development and use, relation of water power and hydrology.

Unit 2
Water Power Estimate
Collection and analysis of stream flow data, mass curve, flow duration curves, construction and utility of these curves, effect of storage and pondage, estimates of available water power.

Unit 3
Water Way
Intake, gates, valves, cannels, surges and its effects, penstocks, classification, design, criteria, economical diameter, water hammer, surg tank.

Unit 4
Hydraulic Turbines
Classification of turbines, Francis, Kaplan and Pelton Turbines, Component parts and their function, Draft tubes and their theory, Similarity laws and specific speed unit, Quantities, performance curves, Governing of turbines, selection of turbines, cavitation in turbines.

Unit 5
Power House and Equipment
Location of power house, general arrangement of Hydroelectric unit, Number and size of units, Power house substructure, Pumped storage plant.

Name of Text Books:
Water Power Engineering – M.M. Dandekar, K.N. Sharma (Vikas Publishing House Pvt. Ltd.)
Water Power Engineering – Deshmukh (Dhanpat Rai & Sons)

Name of Reference Books:
Irrigation and Water Power Engineering – B.C. Punmia (Laxmi Publication)
Hydro Electric Engineering – Creager and Justin (Willay Institutional)
Hydro Electric Engineering Practice – Brown, J.G. (Blackie and Sons Ltd., London)
Irrigation and Water Power Engineering – Dr. P.N. Modi (Standard Book House)
Experiments to be performed (Min 10 experiments)

1. Introduction to latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
2. Geometrical Modelling of RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
3. Modelling of loads and load combinations on RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
4. Analysis and Interpretation of Results of Analysis of RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
5. Design of RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
6. Interpretation of Results of Design of RCC Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
7. Geometrical Modelling of Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
8. Modelling of loads and load combinations on Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
9. Analysis and Interpretation of Results of Analysis of Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
10. Design of Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
11. Interpretation of Results of Design of Steel Frame on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
12. Design of R.C.C. Column on latest version of a Standard Structural Engineering Design Package such as STAAD etc.
13. Design of R.C.C. Isolated Footing on latest version of a Standard Structural Engineering Design Package such as STAAD etc.
14. Case Study of design of a RCC Multistorey Building on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.
15. Case Study of design of a Steel Industrial Building on latest version of a Standard Structural Engineering Design Package such as STAAD Pro.

List of Equipments / Machine Required:

Latest Release of Software Package STAAD Pro (Research Engineers International, Kolkata)
Latest Release of Software Package STAAD etc (Research Engineers International, Kolkata)

Recommended Books:

(1) Reference Manual for Respective Software
(2) Verification Manual of Respective Software
Experiments to be performed (Min 10 experiments)
2. Determination of water content dry density relation using heavy compaction test.
3. To determine California Bearing Ratio for the designing of pavements, laboratory determination of CBR test.
4. To determine in-situ bearing value of subgrade by North Dakota Cone Apparatus.
5. Direct Shear Test on the (1) Dry cohesionless / cohesive soil specimen remoulded / unremoulded (2) Direct shear test – undrained test, direct shear test-consolidated undrained.
6. Triaxial Compression Test (Triaxial compression test): (a) UU, (b) CU, (c) CC.
7. Consolidated test (Remoulded / Unremoulded) Consolidated test (Fixed Ring / Floating Ring).
8. To determine swelling pressure of purely cohesive soil (Remoulded / Unremoulded specimen).
9. Determination of density index (relative density) of cohesionless soils.
10. Study of standard penetration.
11. Determination of bearing capacity of soil by plate load.

List of Equipments / Machine Required:
- Light Compaction Mould
- Heavy Compaction Mould
- Oven
- CBR Apparatus
- North Dakota Cone Apparatus
- Direct Shear Test Apparatus with full accessories
- Triaxial Compression Test Apparatus with full accessories
- Consolidometer Apparatus
- Unconfined Compression Test Apparatus
- Swell Pressure Test Apparatus
- Standard Penetration Test Apparatus with full accessories
- Plate Load Test Apparatus with full accessories
- Soil Sampling Tube

Recommended Books:
- Soil Mechanics and Foundation Engineering – B.C. Punmia (Laxmi Publication)
- Soil Engineering in Theory and Practice (Vol-II) – Alam Singh (Asia Publishing House, New Delhi)
Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester: 6th  
Subject: Environmental Engineering-I Lab  
Branch: Civil Engineering  
Total Practical Periods: 40  
Total Marks in End Semester Exam: 40  
Practical Code: 320623 (20)

Experiments to be performed (Min 10 experiments)

1. To determine acidity of water sample.
2. To determine alkalinity of water sample.
3. To determine hardness of water sample.
4. To determine chloride content of water sample.
5. To determine D.O. content of water sample.
6. To estimate the quantity of BOD from water sample.
7. To determine the availability of chlorine in bleaching powder.
8. To determine the residual quantity of Cl₂ Content.
10. Determination of Break Point Chlorination.
12. Determination of Turbidity.
14. Determination of MPN.
15. Determination of pH of water.

List of Equipments / Machine Required:

- BOD Incubator
- Dust Sampler
- Turbidity meter
- Microscope
- pH meter
- Muffle Furnace
- Hot Air Oven
- Jar Test Apparatus

Name of Text Books:

- Environmental Engineering Lab Manual – Dr. B. Kottaiah & N. Kumaraswamy (Charotar Publications)
- Water Supply Engineering – B.C. Punmia (Laxmi Publication, New Delhi)
- Environmental Science and Engineering – Henry and Heinke (Pearson Education).
Experiments to be performed (Min 10 experiments)

1. Determination of Strength of concrete
2. Determination of Workability by compaction factor
3. Determination of Slump test for a concrete mix
4. Determination of workability by Veebee test
5. Determination of workability by Flow table test
6. Determination of Modulus of elasticity of concrete and strain measurement by longitudinal compressometer
7. Determination of Soundness test on aggregate
8. Determination of Deleterious materials in fine aggregate
9. Determination of flexural strength of concrete
10. Mix Design by I.S. Code method (with OPC Cement)
11. Mix Design by I.S. Code method (with Slag Cement)
12. Mix Design by I.S. Code method (with Admixtures Cement)
13. Determination of Grading curve of Mix aggregate & sieve analysis
   Determination of Compressive strength of concrete by non destructive test – Rebound Hammer

List of Equipments / Machine Required:

- Slump Cone with Tamping Rod
- Concrete Cubes (15 x 15 x 15) cm^3
- Tray (45 x 60) cm^2, (60 x 60) cm^2, (30 x 45) cm^2
- Trowel (6 Nos.)
- I.S. Sieves for Coarse and Fine Aggregate
- Compression Testing Machine (200 T)
- Weighing Balance
- Sieve Shaker
- Compaction Factor Test Apparatus
- Vee-Bee Consistometer
- Flow Table
- Longitudinal Compressometer
- Cylindrical Mould
- Concrete Test Hammer
- Graduated Glass Cylinder (500 ml, 1000 ml)
- Beaker (500 ml)
- Rebound Hammer

Recommended Books:

- Concrete Technology – M.S. Shetty (S. Chand & Co.)
- Concrete Technology – M.L. Gambhir (Tata McGraw Hill)
Unit-I
Managerial Communication Skills: Importance of Business Writing: writing business letters, memorandum, minutes, and reports- informal and formal, legal aspects of business communication, oral communication-presentation, conversation skills, negotiations, and listening skills, how to structure speech and presentation, body language.

Unit-II
Managerial skills: Leadership: Characteristics of leader, how to develop leadership; ethics and values of leadership, leaders who make difference, conduct of meetings, small group communications and Brainstorming, Decision making, How to make right decision, Conflicts and cooperation, Dissatisfaction: Making them productive.

Unit-III
Proactive Manager: How to become the real you: The journey of self-discovery, the path of self-discovery, Assertiveness: A skill to develop, Hero or developer, Difference between manager and leader, Managerial skill check list, team development, How to teach and train, time management, Stress management, Self-assessment.

Unit-IV
Attitudinal Change: Meaning of attitude through example, benefits of positive attitude, how to develop habit of positive thinking, what is fear? How to win it? How to win over failure? How to overcome criticism? How to become real you? How to Motivate?

Unit-V
Creativity – a managerial skill, Trying to get a grip on creativity.

Text & Reference Books:
1. Basic Managerial skills for all by E.H. McGrawth, Prentice Hall India Pvt Ltd, 2006
2. How to develop a pleasing personality by Atul John Rego, Better yourself books, Mumbai, 2006
3. The powerful Personality by Dr. Ujjawal Patni & Dr. Pratap Deshmukh, Fusion Books, 2006
4. How to Success by Brian Adams, Better Yourself books, Mumbai, 1969