ChhattisgarhSwamiVivekanand Technical University, Bhilai
SCHEME OF TEACHING & EXAMINATION
BE (Civil Engineering) III Semester

Sl. No.	Board of Study	Subject Code	Subject	Period per week			Scheme of Exam			Total Marks	Credit L+(T+P)/2
				L	T	P	ESE	CT	TA		
1	Appl. Mathematics	320351(14)	Mathematics III	4	1	-	80	20	20	120	5
2	Civil Engg	320352(20)	Fluid Mechanics – I	4	1	-	80	20	20	120	5
3	Civil Engg	320353(20)	Surveying – I	3	1	-	80	20	20	120	4
4	Civil Engg	320354(20)	Mechanics of Solids	3	1	-	80	20	20	120	4
5	Civil Engg	320355(20)	Building Materials	3	1	-	80	20	20	120	4
6	Civil Engg	320356(20)	Engineering Geology	3	1	-	80	20	20	120	4
7	Civil Engg	320361(20)	Fluid Mechanics – I Lab	-	-	3	40		20	60	2
8	Civil Engg	320362(20)	Surveying Field Work- I	-	-	3	40		20	60	2
9	Civil Engg	320363(20)	Materials Testing Lab	-	-	3	40		20	60	2
10	Civil Engg	320364(20)	Engineering Geology Lab	-	-	3	40		20	60	2
11	Humanities	320365(46)	Value Education	-	-	1			40	40	1
12			Library	-	-	1					
			Total	**20**	**6**	**14**	**640**	**120**	**240**	**1000**	**35**

L: Lecture, T: Tutorial, P: Practical, ESE: End Semester Exam, CT: Class Test, TA: Teachers Assessment

Note: Duration of all theory papers will be of Three Hours.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**III**
Subject:	**Mathematics - III**	Code:	**320351(14)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. Make student to understand FourierSeries.
2. To understand the Laplace Transform.
3. To understand the Partial Differential Equation..
4. To provide an understanding about Complex variables
5. To understand statistics

UNIT- I **FOURIER SERIES:** Euler's Formula, Functions having points of discontinuity, Change of interval, Even & Odd functions, Half range series, Harmonic analysis.

UNIT-II **LAPLACE TRANSFORM:**Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives & integrals, Multiplication by tn, Division by t, Evaluation of integrals, Inverse Laplace Transform, Convolution theorem, Unit step function, Unit impulse function, Periodic function, Application to solution of ordinary differential equations.

UNIT- III **PARTIAL DIFFERENTIAL EQUATION:**Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables.

UNIT-IV **COMPLEX VARIABLES:**Derivative, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Flow problems, Complex integration, Cauchy theorem, Cauchy integral formula, Taylor & Laurent series, Singularity, Residue, Evaluation of real definite integrals.

UNIT-V **STATISTICS:**Random variables, Discrete & continuous probability distributions, Expectation, Mean & Standard Deviation, Moments & moment generating function, Distributions- Binomial, Poisson and Normal distributions.

Text Books:

1. Higher Engg. Mathematics by Dr. B.S. Grewal– Khanna Publishers.
2. Advanced Engg. Mathematics by Erwin Kreyszig – John Wiley & Sons.

Reference Books:

1. Advanced Engg.Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.
2. Applied Mathematics by P.N.Wartikar& J.N. Wartikar. Vol- II– Pune VidyarthiGrihPrakashan,Pune
3. Applied Mathematics for Engineers & Physicists by Louis A. Pipes- TMH.

Course Outcome:

1. Students are expected to understand Fourier Series
2. Students are expected to understand LAPLACE TRANSFORM
3. Students are expected to understand PARTIAL DIFFERENTIAL EQUATION
4. Students are expected to understand COMPLEX VARIABLES and STATISTICS

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**III**
Subject:	**Fluid Mechanics – I**	Code:	**320352(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. Be familiar with different fluids
2. Be familiar with different fluids flow condition.
3. Learning different flow & losses in pipes.
4. Be familiar with flow in open channel & different sections.

UNIT- I INTRODUCTION -Fluid and continuum, physical properties of fluids ideal and real fluid, Newtonian and Non-Newtonian Fluid. Fluid Statics-Pressure density height relationship, pressure measurement by Manometers, Pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, metacentric height,

UNIT-II Kinematics of fluid flow -Steady and unsteady flow, uniform and non uniform flow, laminar and turbulent flow, one, two and three dimensional flow, streamlines, streak lines and path lines, circulation and vorticity, rotational and irrotational flow, velocity potential and stream function, continuity equation.

UNIT- III Dynamics of fluid flow-Euler's equation of motion along a streamline and its integration, Bernoulli's equation and its applications – Pitot tube, Venturimeter, orificemeter, nozzles, momentum equation and its application to stationary and moving plates/vanes, pipe bends, problems related to combined application of energy and momentum equations.

UNIT-IV Flow in Pipes-Reynolds's experiment, experimental determination of critical velocity, transition from laminar to turbulent flow, Laminar flow through circular tubes, flow between parallel plates, minor losses in pipe lines, loss due to sudden contraction, expansion, etc; Hot wire anemometer and LDA.Flow in open ChannelComparison between open channel and pipe flow, definition of uniform and non-uniform flow, uniform flow formulae, Chezy's and Manning's Formula, Hydraulically efficient channel section of rectangular, trapezoidal and circular type.

UNIT-V Flow through mouthpiece and orifices-Hydraulic coefficients of orifice, bell method orifice, mouthpieces, Borda's mouthpiece, running free and submerged.Notches and Weirs-Rectangular, triangular and trapezoidal notches and weir, cippoletti and broad crested weir, aeration of nappe, cavitations submerged weir.

Text Books:

1. Fluid Mechanics and Machines – Dr. A.K. Jain (Khanna Publications)
2. Fluid Mechanics and Machines – Dr. R.K. Bansal (Laxmi Publications)
3. Fluid Mechanics – Dr. P.N. Modi (Standard Book House)

Reference Books:

1. Mechanics of Fluid – Irving H. Shames (McGraw Hill)
2. Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India)
3. Fluid Mechanics – R.J. Garde (New Age International Publication)
4. Fluid Mechanics – Streeter V.L. & Wylie E.B. (Tata McGraw Hills)
5. Fluid Mechanics – John F. Douglous (Pearsons)

Course Outcomes:

1. Students are expected to understand different types of fluids.
2. Students are expected to compare fluids flow condition.
3. Students are expected to understand & evaluate flow in pipes & losses.
4. Students are expected to compare flow of fluids

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**III**
Subject:	**Surveying – I**	Code:	**320353(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. To provide basic knowledge about principles of surveying for location, design and construction of engineering projects
2. Students develop skills using surveying instruments including measuring tapes, automatic levels, theodolites, and electronic distance measurement equipment.
3. The ability to identify error sources and the procedures to minimize errors.
4. Use standard survey tools
5. Understand and apply measurement error, accuracy, precision and techniques to improve accuracy of surveys

UNIT- I **Leveling -** Different methods of determining elevations: Spirit, Trigometric, Barometric and Photogrammetric methods, Spirit leveling-Definitions of terms, Principle, Construction, Temporary and permanent adjustment of levels. Sensitivity of bubble tube, Automatic levels, Leveling staves, Methods of spirit leveling Booking and reduction of field notes, Curvature and refraction, Reciprocal leveling Plotting of profiles, Barometric leveling, Trigonometric leveling-simple and reciprocal observations

UNIT-II **Contouring -** Direct and Indirect methods of contouring. Interpolation of contours, Drawing section from contour map, Application and Modern methods of depicting relief on a Map. **Minor Instruments-** Construction and field use of altimeter, Description and use of Hand level, Abney Level, clinometers, ceylonghat tracer, Box Sexant, Pentagraph, planimeter, ediograph.

UNIT- III **Theodolite And Traversing-** Venire and microptic theodolites, Temporary and permanent adjustments, Requirements of non-adjustable parts, Measure of horizontal and vertical angles by different methods Principle of traversing by theodolite, Field work and checks,

UNIT-IV **Traverse Computations and Plane Table Survey -** Computation of coordinates, Source of errors, Precision of traversing, Checking and Balancing the traverses, Principles, Advantages and disadvantages, Plane table equipment, Different methods of Plane Table Surveying, Resection-Two and Three point problems. Fields work in Plane Table Surveying and contouring.

UNIT-V **Curves -** Classification of curves; Elements of Circular, compound, Transition and Vertical curves, Theory and method of setting out Simple, Transition, compound and Vertical curves with field problems.

Text Books:

1. Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
2. Surveying (Vol. II & III) – Agor, R (Khanna publications, Delhi, 1995)

Reference Books:

1. Surveying (Vol. II & III) – Arora, K.R. (Standard Book House, Delhi, 1993)
2. Fundamentals of Surveying – S.K. Roy (Prentice Hall of India)
3. Surveying (Vol. I & II) – S.K. Duggal (Tata McGraw Hill)
4. Surveying (Vol. I & II) – Kanetkar T.P. (Pune VidyarthiGrihaPrakashan, Pune)
5. Surveying (Vol. I & II) – C Venkataramaih (Universitires Press Hyderabad)

Course Outcomes:

Students will be able to:

1. Determine elevations by applying different techniques.
2. Deal with the minor instruments and will be familiar with their functioning.
3. Do transverse computations, detect and rectify errors.
4. Set out various curves with the field problems.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**III**
Subject:	**Mechanics of Solids**	Code:	**320354(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. To understand the basic concepts of strength of materials which is the base of structural engineering.
2. To know the relation between stress, strain and between different elastic constants.
3. To analyze stresses and strains at any point in a material with various stress conditions.
4. To draw the bending moment and shear force diagram and to find out bending and shear stresses at any point in a cross section of the beam.
5. To analyze column, retaining walls and gravity dams.
6. To understand the concept behind unsymmetrical bending and torsion.

UNIT- I **Stress Strain Relations -** Types of stresses and strains, Mechanicals properties and testing of steel, Hooke's law, Uniaxial tensile test, stress – strain curve, hardness, impact, Poisson's ratio, Modulus of rigidity, Bulk modulus, Relation between the elastic constants, Thermal effects, Elongation of bars of constant and varying sections. Statically indeterminate problems in tension and compression. Thin cylindrical and spherical vessels.

UNIT-II **Analysis of Stresses and Strains -** Body forces, Surface forces, Internal Force, Stress at a point. Components of stress in rectangular coordinates, Principal stresses, Transformation equations, Stress invariants. Plane stresses. Mohr's circle for plane stress, Differential equations of equilibrium. Deformable bodies, Concepts of normal strain and shear strain, Strain components at a point. Transformation equations. Principal strains. Mohr's circle for strains. Compatibility conditions. Displacement equation of equilibrium, Plane strain.

UNIT- III **Bending of Beams -**Theory of simple bending - limitations - bending stresses in beams of different cross sections, beams of uniform strength, beams of two materials, shear stresses in symmetrical elastic beams transmitting both shear and bending moment. Shear force and bending moment diagrams for simply supported overhanging. and cantilever beams and statically determinate plane frames

UNIT-IV **Columns and Combined stresses -**Stable and unstable equilibrium, Short columns, Euler's formula for long columns, Rankin's formula. Beams subjected to bending and shear, Eccentrically loaded short column, Kern of rectangular sections, Middle third rule, stability of gravity dams & retaining walls.

UNIT-V **Unsymmetrical Bending and Torsion** Unsymmetrical bending – Location of neutral axis, Shear flow - shear centre - determination of shear centre for simple sections. Torsion of circular solid and hollow circular shafts - power transmission. Closed coiled and open coiled helical springs.

Text Books:

1. Strength of Materials – R.K. Rajput (S. Chand & Co.)
2. Mechanics of Materials – B.C. Punmia (Laxmi Publication)

Reference Books:

1. Mechanics of Structures (Vol. – I) – Junarkar (Charotar Publications)
2. Strength of Materials – Timoshenko, S. & Gere (CBS Publishers)
3. Introductions to Solid Mechanics –Shames & Pitarresi (Prentice Hall of India)
4. Engineering Mechanics of Solid – Popov (Pearson Publication)
5. Strength of Materials – S. Ramamurtham (Dhanpat Rai Publications)
6. Strength of Materials (Part-I) – Timoshenko (CBS Pubishers)

Course Outcome:

1. The basic concepts of Mechanics of Solids are clear to students.
2. By knowing the stresses and strains developed in a structure, the student is able to find out at which point structure is strong and at which point it requires strengthening.
3. The bending moments and shear force at any cross section of the beam can be easily found out with the help of BMD and SFD, which enables the student now to study and design the beam.
4. Knowing the analysis of dams and retaining walls, the stresses at different points of dam and retaining can be known and these structures can be designed.
5. The student is now ready to learn designing of different structures. The base of study of structural analysis and designing is formed, which are the subjects of higher semesters.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**III**
Subject:	**Building Materials**	Code:	**320355(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. To provide an understanding of materials of construction.
2. To provide an understanding of Special concrete.
3. To provide an understanding about timber, plywood, paints and glass materials.

UNIT- I **Cement and aggregates-** Types of Cement, Hydration of cement, tests on properties of cement, ferro cement. Classification of Aggregates (Coarse and Fine) and their properties, tests on aggregates.Classification of Pozzolanas and applications.

UNIT-II **Concrete -** Properties of concrete in fresh and hardened state, water cement ratio, Modulus of elasticity, factors affecting strength of concrete and durability, mixing, transporting, placing, compacting and curing concrete, variables in proportioning concrete mixes, admixtures in concrete, tests on concrete.

UNIT- III **Ceramic Materials-** Introduction to ceramics, types of ceramic products, properties of ceramics, ceramic building products, manufacturing of ceramic products.

UNIT-IV **Timber and Plywood -** Characteristics of good timber, seasoning and preservation, names of timber producing trees and their relative market value. Types and uses of plywood, veneers and hardboards. Low cost materials for construction – System concepts, cost effective materials, industrial wastes, agricultural wastes, methods needed for propagation of new technologies from laboratory to field.

UNIT-V **Paints, Glass etc.** Commercially available varieties of ceramics, glass and their uses, types of tiles, method of manufacturing and tests for suitability. Uses of Plastics and PVC. Composition and use of paints, varnishes and distempers. Composite materials, types and uses.

Text Books:

1. Building Materials – S.K. Duggal (New Age Publication)
2. Building Materials – S. C. Rangwala (Charotar Publication)
3. Building Materials – M.L. Gambhir, NehaJamwal (Mc. Grawhill)

Reference Books:

1. Concrete Technology – A.M. Neville & J.J. Brooks (Pearson Education)
2. Concrete Technology – M.S. Shetty (S. Chand & Co.)
3. Engineering Materials – Surendra Singh (Laxmi Publication)
4. Construction Engineering and Management – S. Seetharaman (UmeshPublication)
5. Building Materials – Gurucharan Singh (Standard Publishers, Delhi)

Course Outcome:

1. Students are expected to understand materials of construction.
2. Students are expected to know about Special concrete.
3. Students are expected to read about timber, plywood, paints and glass materials

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**III**
Subject:	**Engineeirng Geology**	Code:	**320356(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. To understand fundamental concepts of engineering geology
2. To learn about the various types of rocks and their properties.
3. To study about the Earthquakes, its causes, classification etc
4. To gain knowledge about Landslides, Land subsidence and Geological Hazards
5. To learn about Geological investigations in Civil Engg

UNIT- I **Introduction to Engg. Geology -**To understand fundamental concepts of engineering geology, engineering strength, physical & mechanical properties of minerals, rock forming minerals: A case study.

UNIT-II **Rocks and its formations -**Types of rocks and origins (structure, texture, agents), ternary diagrams, causes of metamorphism, Folds, Faults, Unconformity & joints: a case study.

UNIT- III **Earthquakes -** Earthquake, its causes, classification, seismic zones of India , seismotectanics of the Indian plate, earthquake problem and its preventive measures in construction of building , reservoir , dams , underground railway track & tunnels etc : A case study.

UNIT-IV **Landslides, Land subsidence and Geological Hazards -** Landslides, its causes, classification and preventive measures, land subsidence, its causes and preventive measures, major geological hazards & geological considerations in design of constructed facilities and infrastructure, mitigation of landslide hazard: A case study.

UNIT-V **Geological investigations in Civil Engg -**Geophysical techniques as aids in engineering geological investigations, geological conditions necessary for construction of bridges, dams, tunnels, building, road cuttings, concept of geological maps, important terminology used for map and making a section from the map: A case study

Text Books:

1. A Textbook of Geology – Mukherjee P.K. (World Press Publishers)
2. Engineering Geology – D.S. Arora (Mohindra Capital Publisher, Chandigarh)

Reference Books:

1. Geology and Engineering – Leggot, R.F. (Mc-Graw Hill, New York)
2. A Geology for Engineers – Blyth, F.G.M. (Arnold, London)
3. Civil Engineering Geology – Cyril Sankey Fox (C. Lockwood and son, U.K.)
4. Engineering and General Geology – Prabin Singh (Katson Publication House)

Course Outcomes:

Students will be able to:

1. Show the knowledge about engineering geology.
2. Show knowledge of the most important rocks and minerals and be able to identify them.
3. Analyze the Earthquakes and its various types.
4. Understand the characteristics of various Geological Hazards.
5. Do the Geological investigations; understand the geological conditions and geological maps.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**III**
Subject:	**Fluid Mechanics – I Laboratory**	Code:	**320361(20)**
Total Lab Periods:	**48**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: *(At leastTen experiments are to be performed by each student)*

1. To determine the met centric height of a ship model.
2. Verification of Bernoulli's equation.
3. Verification of momentum equation.
4. To calibrate a venturimeter and study the variation of the coefficient of discharge with the Reynolds number.
5. To calibrate aorificemeter and study the variation of the coefficient of discharge with the Reynolds number.
6. Experimental determination of critical velocity in pipe.
7. Determination of head loss coefficient due to sudden expansion in pipe.
8. Determination of head loss coefficient due to sudden contraction in pipe.
9. Determination of head loss coefficient in pipe bends.
10. To determine the hydraulic coefficients (C*c*, C*d* and C*v*) of an orifice.
11. To determine the coefficient of discharge of a mouth piece.
12. To calibrate a triangular notch.
13. To calibrate a rectangular notch.
14. To obtain the surface profile and the total distribution of a forced vortex.

Equipment/Machines/Instruments/Tools/Software Required:

- Ship Model
- Bernoulli's Apparatus
- Apparatus for momentum theorem
- Venturimeter
- Orificemeter
- Pipe Flow Apparatus
- Orifice Apparatus
- Mouth Piece Apparatus
- Notch Apparatus
- Vortex Flow Apparatus

Recommended Books:

1. Hydraulics Laboratory Manual – S.K. Likhi (New Age International Ltd.)
2. Fluid Mechanics – JagdishLal (Metropolitan Educational, New Delh-2)

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**III**
Subject:	**Surveying Field Work I**	Code:	**320362(20)**
Total Lab Periods:	**48**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: *(At leastTen experiments are to be performed by each student)*

1. To determine the elevation of a point with respect to reference elevation by Fly Leveling
2. To determine sensitivity of bubble tube of a dumpy level.
3. Contouring and its plotting.
4. Measurement of horizontal angle by repetition method.
5. Measurement of horizontal angle by reiteration method.
6. To determine the height of object when base is accessible.
7. To determine the height of tower when base is inaccessible and instrument stations are in same vertical plane.
8. To find out the position of points by the Plane Table Radiation and Intersection method.
9. Determination of location of a point with the help of Two point problem.
10. Determination of location of a point with the help of Three point problem.
11. Setting out of curve by ordinates or offsets from long chord.
12. Setting out of curve by successive bisection of arcs.
13. Setting out of curve by offsets from chords produced .
14. Setting out of curve by two theodolite method.
15. Setting out of curve by Rankine's method.

Equipment/Machines/Instruments/Tools/Software Required:

- Metric Chain (30 m)
- Tape (15m, 30 m)
- Ranging Rod (2 m, 3m)
- Plumb bob
- Arrows
- Theodolite
- Leveling Staff (Folding and Non-folding)
- Wooden Pegs
- Plain Table Accessories (Drawing Board – 70 x 60 x 1.5 cm, Spirit Level, Trough Compass, Tripod Stand, Alidade, Plumb bob for centering)
- Offset Rod
- Optical Square
- Cross Staff

Recommended Books:

1. Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
2. Surveying (Vol. I & II) - C Venkataramaih (Universities Press Hyderabad)
3. Surveying (Vol. I & II) – Kanetkar T.P. (Pune VidyarthiGrihaPrakashan, Pune)

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**III**
Subject:	**Material Testing Laboratory**	Code:	**320363(20)**
Total Lab Periods:	**48**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: *(At leastTen experiments are to be performed by each student)*

1. Determination of Compressive strength of cement.
2. Determination of Tensile strength of cement.
3. Determination of Fineness of cement by sieving method.
4. Determination of Fineness of cement by Blain Apparatus.
5. Determination of Soundness of cement.
6. Determination of Specific gravity of cement.
7. To determine Uniaxial Tensile Test of mild steel.
8. To determine IzodCharpy Value of given mild steel.
9. To determine the Rockwell Hardness of given Material.
10. To determine Compressive Strength of Wood: (a) Along the fibre and (b) Across the fibre.
11. Determination of Specific gravity and water absorption of aggregate.
12. Abrasion Test on tiles.
13. Impact test on tiles.
14. Flexural Strength of Tiles.
15. To study the Cupping Test Machine and determine Ericheser value of mild steel sheet.

Equipment/Machines/Instruments/Tools/Software Required:

- Cube mould 7.06 cm size
- IS Sieve 80, 40, 20, 10, 4.75, 2.36, 1.18 mm and 600, 300, 150, 90 Micron
- Sieve Shakers
- Tensile Strength Testing Machine
- Oven Wire Basket
- Spring Balance and Weighing Balance
- Air permeability blain apparatus
- Abrasion Testing Machine
- Flexural Strength Testing Machine for tiles
- Universal Testing Machine
- Hardness Testing Machine
- Impact Testing Machine

Recommended Books:

1. Lab Manual Concrete Lab – M.L. Gambhir (Tata McGraw Hill)
2. Concrete Technology – M.S. Shetty (S. Chand & Co.)

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**III**
Subject:	**Engineering Geology Laboratory**	Code:	**320364(20)**
Total Lab Periods:	**48**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: *(At leastTen experiments are to be performed by each student)*

1. Identification of granite, pegmatite, syenite megascopic observations.
2. Identification of basalt, gabbro, charnokite, dolerite.
3. Identification of limestone, sand - stone, shale.
4. Identification of conglomerate, breccias, clay.
5. Identification of slate, phyllite, marble.
6. Identification of quartzite, schist, gneiss.
7. A study on simple geological maps
8. To Draw a cross section, filling of geological data there in.
9. To make a sketch of faults, with identification of folds, faults and unconformity.
10. A case Study of structural folds, faults and unconformity.
11. A study of Talc, gypsum, calcite, fluorite apatite.
12. A study of feldspar, quartz, topaz, corundum.
13. A study of hornblende, garnet, tourmaline asbestos, olivine,.
14. A study of serpentine, barite, muscovite, biotite, arpiment, realgar, sulpher, amethyst & varieties of uartz, zeolite
15. A study of Hematite, magnetite, pyrite, chalespyrite, pyrolusite, psilomelane, beryl, magnesite, bauxite, zincite, galena etc.

Equipment/Machines/Instruments/Tools/Software Required:

- Crystallographic Model
- Wooden Cabinet
- Axis of symmetrical of 6 System
- Planes of symmetrical of 6 System
- Crystallographic Axis & Centre of System
- Mohr Scale of Hardness
- Streak Plates
- Hardness Testing Knife
- Model Showing Strike, Dip, Pitch
- Symmetrical Anticline Showing Axis-Axial Plane
- Asymmetrical Anticline Showing Axis-Axial Plane
- Isoclinals Anticline & Syncline
- Recumbent Fold
- Fan Fold
- Step Fault
- Rock Specimen
- Wooden Specimen Tray
- Polarizing Petrological Microscope
- Mineral Specimens

Recommended Books:

1. Geology and Engineering – Leggot, R.F. (Mc-Graw Hill, New York)
2. Engineering and General Geology – Prabin Singh (Katson Publication House)

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch:	**Civil Engineering**	Semester:	**III**
Subject:	**Value Education**	Code:	**320365(46)**
No. Of Periods:	**2 Periods/Week**	Total Tutorial Periods:	**NIL**
Maximum Marks:	**40**	**Minimum Marks:**	**24**

Course Objectives:

1. This course is designed to provide the importance of education with why, what & how.
2. To impart students with an understanding of fundamental humanitarian viewpoint and its outcomes.
3. To provide the knowledge about whole existence and its impact on values.
4. To bring the awareness about life long exercise so that they can fulfill their responsibility towards themselves, the family, the society, the planet.

UNIT- I **Aim of Education and Necessity for Value Education:** Education in values/wisdom/etc and education in traits/technologies/etc as the two fundamental strands of education; Answer to the frequently asked questions such as "Why to do studies", "What studies to do in overall", "How to do studies in a proper way", "How to think systematically and talk systematically"

UNIT-II **Humanitarian Viewpoint and Basic Human Objective:** Meaning and concept of happiness, Need for a fundamental viewpoint to judge things in all cases of human concerns, Proposal of the natural path of humanitarian coexistentialism; Consciousness development and its expression; Fundamental want of sustainable happiness in human being; Understanding the distinct activities and needs of self (I) and body in human being; Fundamental goal of human being; Sustainable-solution in individual (At the place of delusion); Sustainable-prosperity in family (At the place of poverty); Sustainable-cooperation in society (At the place of competition); Sustainable-coexistence in planet (At the place of struggle)

UNIT- III **Elements of Holistic and Systematic Perspective:** Need for study of fundamental information categories to develop holistic perspective; Particular-time actions and general-time laws; Need for fundamental information sequence to develop systematic perspective, Some examples for systematic study sequence

UNIT-IV **Elements of Society-friendly and Environment-friendly Goals:** Elements of Knowledge of whole existence; Elements of Knowledge of human being; Elements of fundamental Values and Wisdom; Value spectrum with reference to general relationships and particular relationships of the objects in nature; Elements of History and Contemporarity used to set current goals; Elements of Sciences and Techniques to formulate methods to achieve goals; Elements of Motoricity and Mattericity to make actions to execute the methods

UNIT-V **Lifelong Exercise for All-round Sustainability:** Collecting information for sustainability issues; Motivating people towards sustainable life-style; Ability to identify and develop appropriate technologies and management patterns for society-friendly and environment-friendly systems for production /protection/ utilization/ experimentation ; Ability to establish and execute the fundamental five-fold system in order to ensure sustainable peace-and-prosperity worldwide.

Text Books:

Value Education for Consciousness Development by Dr P B Deshmukh, Radha K Iyer, and Deepak K Kaushik (2nd Edition, 2012, ISBN: 978-81-924034-0-3)

Reference Books:

1. International Research Handbook on Values Education and Student Wellbeing by Terence Lovat, Ron Toomey, Neville Clement (Eds.), Springer 2010, ISBN: 978-90481-86747
2. Values Education and Lifelong Learning: Principles, Policies, Programmes by David N Aspin and Judith D Chapman (Eds.); Springer 2007, ISBN: 978-1-4020-6183-7
3. Fundamentals of Ethics for Scientists and Engineers by E G Seebaur and Robert L Berry, 2000, Oxford University Press

Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING & EXAMINATION

BE (Civil Engineering) IV Semester

Sl.No.	Board of Study	Subject Code	Subject	Periods per Week			Scheme of Exam Theory/Practical			Total Marks	Credit L+(T+P)/ 2
				L	T	P	ESE	CT	TA		
1	Civil Engg.	320451 (20)	Structural Analysis I	4	1		80	20	20	120	5
2	Civil Engg.	320452 (20)	Fluid Mechanics II	4	1		80	20	20	120	5
3	Civil Engg.	320453 (20)	Surveying II	3	1		80	20	20	120	4
4	Civil Engg.	320454 (20)	Civil Engineering Drawing	1	3		80	20	20	120	4
5	Civil Engg.	320455 (20)	Building Construction	3	1		80	20	20	120	4
6	Civil Engg	320456 (20)	Transportation Engineering-1	2	1		80	20	20	120	3
7	Civil Engg.	320461 (20)	Fluid Mechanics II Lab			3	40		20	60	2
8	Civil Engg.	320462 (20)	Surveying Field Work II			3	40		20	60	2
9	Civil Engg.	320463 (20)	Civil Engineering Drawing			3	40		20	60	2
10	Civil Engg	320464 (20)	Transportation Engineering-1-lab			3	40		20	60	2
11	Humanities	320465 (46)	Health, Hygiene & Yoga			2			40	40	1
12			Library			1					
			Total	**17**	**8**	**15**	**640**	**120**	**240**	**1000**	**34**

L: Lecture, T: Tutorial, P: Practical, ESE: End Semester Exam, CT: Class Test, TA: Teachers Assessment

Note (1): Duration of all theory papers will be of Three Hours except 'Civil Engineering Drawing' at Sl. No. 4 which will be of Four Hours' duration.

Note (2): Industrial Training of six weeks is mandatory for B.E. student. It is to be completed in two parts. The first part will be in summer after IV Semester after which students have to submit a training report which will be evaluated by the college teachers during B.E. V Semester.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**IV**
Subject:	**Structural Analysis – I**	Code:	**320451 (20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. Make student to understand between Determinate and Indeterminate structures.
2. To understand the methods to analyse slopes and deflections of structures.
3. To understand the method of Strain Energy to analyse deflections of structures.
4. To provide an understanding about loads position variation on structures and corresponding analysis by rolling loads and ILDs.
5. To understand behaviour of suspension bridges, cables and Arches.

UNIT- I **Determinate Structures-** Determinate vs. Indeterminate structures, static indeterminacy, External and internal indeterminacy, rules for determining degree of indeterminacy, Degree of Freedom Per Node,KinematicIndeterminacy.Pin Jointed determinate space trusses, distinction between determinate and indeterminate spacetrusses and simple and complex space trusses, Analysis of simple and determinate space trusses.Method of Substitution and Method of tension coefficient.

UNIT-II **Deflection and Slope -** Moment curvature relation, The elastic curve, Relation between Loading, SF, BM, Slope and Deflection, Deflection and slopes of statically determinate beams by Double integration method, Macaulay's method, Area moment method. Basics of Conjugate beam method.

UNIT- III **Strain Energy-** Strain energy due to axial load, bending, shear and torsion, Castigliano's theorem for deflection, Betti's theorem - Maxwell's law of reciprocal deflections, unit load and strain energy method for determination of deflections of statically determinate beams - pin-joined trusses and rigid frames.

UNIT-IV **Rolling Loads & Influence Lines-** Introduction to Rolling loads - concept of influence lines - influence lines for reaction, shear force and bending moment in simply supported beams - influence lines for forces in trusses – analysis for different types of rolling loads - single concentrated load - several concentrated loads - uniformly distributed load shorter and longer than the span, Absolute maximum bending moment.

UNIT-V **Cables, suspension bridges & arches** Analysis of forces in cables with concentrated and continuous loadings - suspension bridges with three-hinged and two-hinged stiffening girders, Theory of arches - Eddy's theorem - analysis of three-hinged and two-hinged arches.

Text Books:

1. Basic Structural Analysis (Vol. I & II) – Bhavikatti S.S. (Vikas Publishing)
2. Theory of Structures – B.C. Punmia (Laxmi Publication)

Reference Books:

1. Theory & Analysis of Structures (Vol. – I & II) – Jain, O.P. and Jain B.K. (Nem Chand)
2. Structural Analysis – R.C. Hibber (Pearson Publication)
3. Structural Analysis – Ghali, A. & Neville, M. (Chapman & Hall Publication. 1974)
4. Elementary Structural Analysis – Willbur and Norris (Tata McGraw Hill)
5. Structural Analysis – Negi L.S. &Jangid R.S. (Tata McGraw Hill)
6. Theory of Structures – Ramamurtham S. & Narayan R. (DhanpatRai Publications)

Course Outcomes:

1. Students are expected to understand various methods to analyse structures for slopes and deflections.
2. Students are expected to understand various types' determinate and indeterminate structures.
3. Students are expected to understand rolling effects of loads and Influence diagrams.
4. Students are expected to understand concept of bridges of suspension and arch types.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**IV**
Subject:	**Fluid Mechanics – II**	Code:	**320452 (20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. Be familiar with different fluid flowing condition in pipe
2. Determination of hydraulic parameters affecting flow of fluids by various Methods.
3. Learning different effects of pipe flow and their respective analysis.
4. Be familiar with hydraulic machines which has extensive application in Water Supply Civil Engineering Construction projects.

UNIT- I **Turbulent flow in pipe- Nature** of turbulence, free and wall turbulence, turbulent flow in pipes, equation for velocity distribution over smooth and rough surfaces, energy and momentum correction factor, Resistance coefficient (Friction factor) and its variation, Colebrook-White equation, Moody's diagram, Explicit equation for friction factors, concept of equivalent length, pipes in series and parallel, Analysis of pipe network (Hardy-Cross method).

UNIT-II **Boundary layer Analysis-** Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, turbulent boundary layer, and laminar sub layer, Application of momentum equation, local and average friction coefficient. Fluid flow past submerged bodies Drag and lift, drag on sphere, cylinder and disc, Magnus effect.

UNIT- III **Non-uniform flow in open channel -** Specific energy, critical flow, analysis of flow over hump and transition, broad crested weir, equation of gradually varied flow, hydraulic jump and evaluation of its elements in rectangular channel.

UNIT-IV **Compressibility effect in pipe flow -**Transmission of pressure waves in rigid and elastic pipes, water hammer, **Dimensional analysis and Hydraulic similitude** Dimensional analysis, Buckingham's theorem, important dimensionless numbers and their significances, geometric, kinematics and dynamic similarity, model study.

UNIT-V **Hydraulic Machines -** Turbines: Classification of turbines, draft tube, specific speed, unit quantities, and characteristics curves of turbines, and governing of turbine**. Pump**: Classification of pumps, types, efficiencies, specific speed, selection, cavitations, characteristic curves.

Text Books:

1. Fluid Mechanics and Machines – Dr. A.K. Jain (Khanna Publications)
2. Fluid Mechanics and Machines – Dr. R.K. Bansal (Laxmi Publications)
3. Fluid Mechanics – Dr. P.N. Modi (Standard Book House)

Reference Books:

1. Mechanics of Fluid – Irving H. Shames (McGraw Hill)
2. Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India)
3. Fluid Machines – Dr. JagdishLal (Metropolitan Book Company Private Ltd.)

Course Outcome:

1. Students are expected to find turbulence flow in pipe .
2. Students are expected to analyse flow of fluids in pipe network.
3. Students are expected to understand & evaluate flow in open channel.
4. Students are expected to understand & analyse transmission of pressure waves. .
5. Students are expected to learn hydraulic properties of Turbine & Pumps.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**IV**
Subject:	**Surveying – II**	Code:	**320453 (20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. To be familiar with various aspects of Trilateration and Triangulation
2. To deal with the relevant computations, errors and observations.
3. To gain the knowledge of Tachometry, various systems, instruments etc.
4. To learn the concepts of Photographic and aerial surveying.
5. To learn and apply the concept of Hydrographic surveying.

UNIT- I **Trilateration and Triangulation -** Principle of Trilateration, Reduction of observation, Principle and classification of Triangulation System, Triangulation chains, Strength of Figures, Station marks and Signals, Satellite station, intersected and Resected points, field work- Reconnaissance, Intervisibillty of station, Angular measurement, Base line measurement and its extension, Adjustment of Field observation and computation of co-ordinates.

UNIT-II **Adjustment Computations -**Weighting of observations. Treatment of random errors, probability equation, Normal law of error, Most Probable Value, Propagation of errors and variances. Most probable value, Principle of Least square, Observations and correlative Normal Equations. Adjustment triangulation figures and level nets.

UNIT- III **Tacheometery-**Definitions, Principles of stadia systems. Instrument constants, Substance and Tangential Systems. Construction and use of Reduction Tacheometers, Range Finders, EDM instruments ,Total Station and their uses. Study of Laser Distance Meter.

UNIT-IV **Photographic and aerial surveying -**Photo theodolite, principle of the method of terrestrial photogrammetry, stereo photogrammetry, aerial surveying, scale and distortion of the vertical and tilted photograph, comparison between air photograph and map, Study of GPS, GIS and Remote Sensing.

UNIT-V **Hydrographic surveying -**Introduction, shore line survey, soundings methods, gauges, equipment required for hydrographic surveying, sounding party, methods of locating soundings, reduction of soundings and plotting of soundings, problems related to hydrographic surveying.

Text Books:

1. Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
2. Surveying (Vol. II & III) – Agor, R (Khanna publications, Delhi, 1995)

Reference Books:

1. Engineering Surveying Technology – Kennie, T.J.M. and Petrie G. (Blackie & Sons Pvt. Ltd., London, 1990)
2. Surveying (Vol. II & III) – Arora, K.R. (Standard Book House, Delhi, 1993)
3. Solving Problems in Surveying – Bannister A. and Baker, R. (Longman Scientific Technical, U.K., 1994)
4. Surveying (Vol. I & II) – Kanetkar T.P. (Pune VidyarthiGrihaPrakashan, Pune)
5. Surveying (Vol. I & II) – C Venkataramaih (Universities Press Hyderabad)

Course Outcomes:

Students will be able to:

1. Deal with the various aspects of Trilateration and Triangulation
2. Do the relevant computations, errors and observations.
3. Gain and apply the knowledge of Tacheometery, various systems, instruments etc.
4. Apply the concepts of Photographic and aerial surveying.
5. Efficiently deal with the Hydrographic surveying.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**IV**
Subject:	**Civil Engineering Drawing**	Code:	**320454 (20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Four Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. Make student to understand General Principles of planning.
2. To understand the drawing of plan of single, double story residential buildings
3. To understand the Drawing of section of single and double story residential buildings
4. To provide an understanding drawing of elevation of building
5. To understand detailing of flush shutter, panelled shutter etc

UNIT- I **General Principles of planning -** Aspects, Prospects, Circulation, Grouping, Roominess, Economy, Elegance, Furniture requirements, flexibility, Privacy. Site selection and requirements of different public buildings such as hospitals, schools, hostels using line plan. Municipal regulations and bye-laws for residential buildings.

UNIT-II Drawing of plan of single and double story residential buildings.

UNIT- III Drawing of elevation and section of single and double story residential buildings.

UNIT-IV Single line plan of hostel, primary health centre, school canteen.

UNIT-V Detailing of flush shutter, panelled shutter, fully glazed, half glazed, half glazed and half paneled doors and windows, elements of perspective, example on simple blocks.

Text Books:

1. A course in Civil Engineering Drawing – V.B. Sikka (Katson Technical Publications)
2. Civil Engineering Drawing – Shah, Kala and Patki (Tata McGraw Hill)

Reference Books:

1. A Textbook of Civil Engineering Drawing: Buildings – R.P. Chandel (Katson TechnicalPublications)
2. Planning and Designing Buildings – Y.S. Sane (Allies Book Stall and Engineering BookPublishing Co.)
3. Hospitals: Planning, Design and Management – Kunders, Gopinath&AshokaKatakam(Tata McGraw Hill)
4. A Book of Home Plans – D. N. Ghose (CBS Publishers and Distributors)

Course Outcomes:

1. Students are expected to understand various methods of general principles ofplanning .
2. Students are expected to understand drawing plan of single, double story residential buildings
3. Students are expected to understand drawing of elevation of single & double story buildings

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**IV**
Subject:	**Building Construction**	Code:	**320455 (20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. Make student to understand various parts of building.
2. Make student to understand foundations of structures.
3. To understand the safety precautions & sound proofing.
4. To prepare a base for Civil Engineering Drawing.
5. To provide an understanding about the relevance and application in Civil Engineering Projects.

UNIT- I **Foundations -** Brief study of different types of foundations, nature of soil (expansive or non-expansive, alluvial or residual, sandy or clayey for settlement etc.), approximate values of bearing capacities, breadth and depth of foundation, typical cross sections for foundations under walls and R.C.C. Columns. Foundations in black cotton soils, under reamed pile foundations, foundation failures and remedial measures.

UNIT-II **Masonry -** Technical terms in masonry, classification and brief specifications of stone masonry, bonds in brick masonry, general principles to be observed in stone and Brick Masonry Construction. Walls Different types (load bearing, cavity-walls and partition walls), thickness considerations.Doors, Windows And Lintels Different types based on materials and methods of construction, technical terms, size and locations.

UNIT- III **Floors -** Ground and upper floors, various types, their suitability, construction details of concrete and terrazzo floors, Floor tiles. **Roofs -**Technical terms and different types of pitched and flat roofs.Various roof coverings for pitched and flat roofs. **Ceiling –** Purpose & types of ceiling. Formwork -Different types of formwork, stripping times.

UNIT-IV **Damp Proofing** Causes and effect of Dampness, parts of a building likely to be affected most, methods of dampproofing in different locations including roofs. **Plastering and Pointing -**Types and considerations during plastering and pointing.**Joints-** Construction Contraction and Expansion Joints.

UNIT-V **Stairs** Types based on geometry and material, suitability, proportioning of stairs, lifts and escalators. **Sound Proofing-** Materials and Methods of sound proof construction. Safety Precautions- Safe Practices, Basic First Aid Procedures Construction Teams, Light Construction and Heavy Construction Ceiling, Balcony - Functions, Method of construction

Text Books:

1. Building Construction – B.C. Punmia (Laxmi Publication Pvt. Ltd.),,
2. Building Construction – Sushil Kumar (Standard Publication Distributors)

Reference Books:

1. Building Construction – Gurucharan Singh (Standard Publication Distributors)
2. Building Construction – S. C. Rangwala (Charotar Publishing House, Anand, Gujarat)

Course Outcome:

1. Students are expected to understand various parts of building.
2. Students are expected to understand various types of bonds.
3. Students are expected to read construction drawing of form work.
4. Students are expected to understand importance of safety in construction.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**IV**
Subject:	**Transportation Engineering – I**	Code:	**320456 (20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. Be familiar with principles of Highway planning & Geometric design.
2. Fundamental Concepts of Traffic Engineering.
3. Learning different highway materials & their testing.
4. Learning pavement design & its Construction.
5. Learning different aspect of Airport planning.

UNIT- I Principal of Highway Planning- Road development and planning in India Highway alignment, requirements. Engineering Surveys for highway location Maps and Drawing. Elements of Transportation Engineering (Vehicle, Driver, Terminal and Control).Geometric Design:Cross Section elements of horizontal and vertical Alignment. Highway drainage, Surface and subsoil drainage. Geometry of Hill Roads, curve layout.

UNIT-II Traffic Engineering- Introduction to Traffic flow theory speed-density, speed-flow and flow-density relation, data collection techniques for traffic parameters and delay studies, parking facilities, etc. and their uses. Traffic control. Devices, Prevention of road accidents, rotary intersection, highway lighting,Highway materials: Behavior of highway materials, properties of Sub grade and pavement component materials. Tests on sub grade soil, Aggregate and bituminous materials.

UNIT- III Pavement Design - Study of flexible and rigid pavements, Basic concepts of pavement analysis and design. Stresses in rigid pavements. I.R.C. recommendations.

UNIT-IV **Pavement Construction Techniques and Quality Control -**Types of Pavements water bound macadam, bituminous and cement concrete pavements. Joints in cement concrete pavements, pavement failures. Modern materials in pavements.

UNIT-V Airport Planning - Definition of terms related to airport engineering, factors affecting site, selection, obstructions, various surveys for site selection, zoning laws. Classification of Obstructions Runways Orientation, Basic runway length and its corrections. Geometric design, runway configuration taxiways layout geometric, Standards, exit taxiways fillets separation.

Text Books:

1. Principle and Practices of Highway Engineering – Kadiyali (Khanna Publishers, Delhi)
2. Highway Engineering – S. K. Khanna& C.E.G. Justo (Khanna Publishers, Delhi)

Reference Books:

1. Air-port planning and Design – Khanna and Arora (Khanna Publishers, Delhi).
2. Highway Engineering – Rangawala S.C. (Charotar Publishers).
3. Specifications for Road and Bridge Works – MOST (IRC Publishers).
4. Manual for Survey, Investigation and Preparation of Road Projects – IRC Publication 2001.

Course Outcomes:

1. Students are expected to understand highway planning &design .
2. Students are expected to understand traffic Engineering.
3. Students are expected to understand & evaluate highway construction material.
4. Students are expected to develop exposure in pavement design.
5. Students are expected to learn airport planning.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**IV**
Subject:	**Fluid Mechanics Laboratory – II Laboratory**	Code:	**320461(20)**
Total Lab Periods:	**36**	Batch Size:	**15**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: (At leastTen experiments are to be performed by each student)

1. To study the transition from laminar to turbulent flow and to determine the lower acritical Reynolds's number.
2. To study the velocity distribution in pipe and to compute the discharge by integrating Velocity profile
3. To study the variation of friction factor for pipe flow.
4. To determine the roughness coefficient of a open channel.
5. To determine the coefficient of discharge of a weir.
6. To determine the coefficient of discharge of a venturiflume.
7. Study of the hydraulic jump in a open channel.
8. To determine the coefficient of discharge of a spillway.
9. To study the performance characteristics of Pelton wheel turbine.
10. To study the performance characteristics of Francis turbine.
11. To study the performance characteristics of Kaplan turbine.
12. To study the performance characteristics of variable speed centrifugal pump.
13. To study the performance characteristics of rated speed centrifugal pump.
14. To study the performance characteristics of multistage pump.
15. To study the performance characteristics of reciprocating pump.

Equipment/Machines/Instruments/Tools/Software Required:

- Pipe Flow Apparatus
- Tilting Flume
- Pelton Wheel Turbine
- Francis Turbine
- Kaplan Turbine
- Variable Speed Centrifugal Pump
- Rated Speed Pump
- Multistage Pump
- Reciprocating Pump

Recommended Books:

1. Hydraulics Laboratory Manual – S.K. Likhi (New Age International Ltd.)
2. Fluid Mechanics – JagdishLal (Metropolitan Educational, New Delhi)

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**IV**
Subject:	**Surveying Field Work – II**	Code:	**320462(20)**
Total Lab Periods:	**36**	Batch Size:	**15**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: (At leastTen experiments are to be performed by each student)

1. To perform the experiment for reduction to centre from different positions of a satellite station when: (i) Satellite station in north position, (ii) Satellite station in left position.
2. To perform the experiment for reduction to centre from different positions of a satellite station when: (i) Satellite station in south position, (ii) Satellite station in right position.
3. To find the most probable value of angle for combined triangle by method of difference.
4. To find the most probable value of triangles of a quadrilateral shapes by method of correlates.
5. To find the most probable value of triangles by the method of Gauss rule.
6. Adjustment of two connected triangles.
7. Adjustment of quadrilateral by method of least square.
8. Adjustment of geodetic triangles with central station by method of least square.
9. Determination of Tacheometric constants.
10. Determination of elevation and distance when line of sight inclined upward.
11. Determination of elevation and distance when line of sight inclined downward.
12. Determination of elevation and height by tangential method when both angles are angles of elevation.
13. Study of Electronic Digital Theodolite.
14. Study of Total Station.
15. Study of Auto level.
16. Measurement of sides of a triangle using Laser Distance Meter.

Equipment/Machines/Instruments/Tools/Software Required:

- Metric Chain (30 m)
- Tape (15m, 30 m)
- Ranging Rod (2m, 3m)
- Plumb bob
- Arrows
- Theodolite
- Electronic Digital Theodolite
- Auto level
- Total Station
- Leveling Staff (Folding and Non-folding)
- Wooden Pegs
- Cross Staff
- Laser Distance Meter.

Recommended Books:

1. Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
2. Surveying (Vol. I & II) – Kanetkar T.P. (Pune VidyarthiGrihaPrakashan, Pune)

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**IV**
Subject:	**Transportation Engineering – I Laboratory**	Code:	**320464(20)**
Total Lab Periods:	**36**	Batch Size:	**15**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: (At leastTen experiments are to be performed by each student)

1. Determination of crushing value of aggregates.
2. To determine 10 percent finer value.
3. Determination of abrasion value by Los Angle's Machine.
4. Determination of abrasion value by Deval's Abrasion Machine.
5. Determination of Impact Value of aggregates.
6. Determination of Specific Gravity and Water Absorption of aggregate.
7. Determination of Softening Point of Bitumen.
8. Determination of Ductility Value of Bitumen.
9. Determination of Viscosity Value of Bitumen.
10. Determination of Elongation Index of Aggregate.
11. Determination of Flakiness Index of aggregate.
12. Determination of Penetration Value of Bitumen.
13. Flash and Fire Point Test.
14. Study of Marshal Stability Test.
15. Study of Benkelman Beam.
16. Determination of Angularity number of aggregate.

Equipment/Machines/Instruments/Tools/Software Required:

- Ring and Ball Apparatus
- Standard Penetrometer
- Los Angles Abrasion Machine
- Deval's Abrasion Machine
- Ductility Testing Machine
- Tar Viscometer
- Sieve Shaker
- Standard I.S. Sieves for Fine and Coarse Aggregate
- Length Gauge
- Thickness Gauge
- Crushing Value Cylinder and Mould with Plunger
- Aggregate Impact Testing Machine
- Flash and Fine Point Apparatus
- Benkelman Beam
- Hot Air Oven
- Water Bath
- Marshall Stability Machine and with Mould
- Proving Ring and Dial Gauge
- Weighing Balance up to 10 kg capacity

Recommended Books:

1. Highway Engineering – Justo &Khanna (Khanna Publishers)
2. Highway Engineering Manual – Justo &Khanna (Khanna Publishers)

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**IV**
Subject:	**Civil Engineering Drawing**	Code:	**320463(20)**
Total Lab Periods:	**36**	Batch Size:	**15**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: (At leastTen experiments are to be performed by each student)

1. Introduction to AutoCAD drafting package.
2. To draw the foundation details of internal and external walls.
3. To draw the sigle line plan of a residential building.
4. To draw the doble line plan, elevation and section of single story residential building.
5. To draw the doble line plan, elevation and section of double story residential building.
6. To draw the line plan of a primary school building.
7. To draw the line plan of a hostel building.
8. To draw the line plan of a hospital building.
9. To draw the plan and section of a fully furnished bathroom.
10. To draw the plan and section of a fully furnished kitchen.
11. To draw section and elevation of flush shutter, paneled shutter doors and windows.
12. To draw section and elevation of fully glazed, half glazed, half glazed and half paneled doors and windows.
13. To draw the perspective view of simple blocks and combination.

Equipment/Machines/Instruments/Tools/Software Required:

- PC system.
- AutoCAD Software.

Recommended Books:

1. AutoCAD 2000 Complete – et. al. (BPB Publications)
2. An introduction to AutoCAD 2000 – A. Yarwood (Pearson Educations

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Civil Engineering**	Semester:	**IV**
Subject:	**Health, Hygiene & Yoga**	Code:	**320465(46)**
No. Of Periods:	**2 Periods/Week**	Total Tutorial Periods:	**NIL**
Maximum Marks:	**40**	**Minimum Marks:**	**24**

Course Objectives:

1. To provide understanding the importance of health.
2. To provide insight into the hygiene aspect & quality of life.
3. To study the concepts of various medical therapy.
4. To practice the various yogasans.
5. To provide knowledge about common diseases and its cure through yagasans and pranayam.
6. To develop concentration through various methods.

UNIT- I **HEALTH & HYGIENE:** Concept of health, Physical health and mentall health and wellbeing and how to achieve these, longevity and how to achieve it, concept and common rules of hygiene, cleanliness and its relation with hygiene; Overeating and underrating, amount of food intake required, intermittent fasting; adequate physical labour, sleep; consumption of junk fast food vs nutritious food; fruits, vegetables cereals and qualities of each of these.

UNIT-II **INTRODUCTORY KNOWLEDGE OF COMMON STREAMS OF MEDICINAL CURE:** History, development, basic concepts, modes of operation of Alopathy, Ayurved, Homoeopathy, Biochemic, Unani, Siddha, Accurpressure, Accupunture, Naturopathy, Yogic and Herbal system of medicines, Introduction of Anatomy and Physiology concerned.

UNIT- III **YOGASANS:** Meaning and concept of Yoga, Yogasans and its mode of operation, How to perform Yogasans, Common Yogasans with their benefits, such as, Padahastasan, Sarvangasan, Dhanurasan, Chakrasan, Bhujangasan, Paschimottasan, Gomukhasan, Mayurasan, Matsyasan, Matsyendrasan, Pawanmuktasan, Vajrasan, Shalabhasan, Sinhasan, Shashankasan, Surya Namaskar, Halasan, Janushirasan, Utshep Mudra.

UNIT-IV **YOGASANS FOR COMMON DISEASES:** From Yogic MateriaMedica with symptoms, causes, asans and herbal treatment.

- **Modern silent killers:** High blood pressure, diabetes and cancer, causes and cure; Common health problems due to stomache disorders, such as, indigestion, acidity, dycentry, piles and fissures, artheritis, its causes, prevention and cure.
- **Asans for relaxation:**Shavasan, Makarasan, Matsyakridasan, Shashankasan.
- **Asans to increase memory and blood supply to brain:**Shirshpadasan, Shashankasan.
- **Asans for eye sight:**Tratak, NetiKriya .
- **Pranayam:** Definition and types: NadiShodhan, Bhastrik, Shitakari, Bhramari useful for students.

UNIT-V **CONCENTRATION:** Concentration of mind and how to achieve it. Tratak (त्राटक), Concentration on breath, Japa (जप), Ajapajap (अजपाजप), internal silence (अन्तर्मौन), visualization in mental sky (चिदाकाश धारणा), Concentration on point of light (ज्योति ध्यान), Concentration on feeling (भाव ध्यान), Concentration on figure (मूर्त्त ध्यान).

Text Books:

Health, Hygiene & Yoga, Dr P B Deshmukh, Gyan Book Pvt Ltd. New Delhi.

Reference Books:

(1) Yogic MateriaMedica

(2) Asan, Pranayam and Bandh.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY

BHILAI (C.G.)

Scheme of Teaching & Examination

B.E. (V Semester) Civil Engineering

S. No.	Board of Study	Subject Code	Subject	Periods per Week			Scheme of Examination			Total Marks	Credit L+(T+P)/2
				L	T	P	ESE	CT	TA		
1.	Civil Engineering	**320551 (20)**	Structural Analysis – II	4	1	-	80	20	20	120	5
2.	Civil Engineering	**320552 (20)**	Structural Engineering Design – I	4	1	-	80	20	20	120	5
3.	Civil Engineering	**320553 (20)**	Geotech Engineering - I	3	1	-	80	20	20	120	4
4.	Civil Engineering	**320554 (20)**	Transportation Engineering – II	3	1	-	80	20	20	120	4
5.	Civil Engineering	**320555 (20)**	Numerical Methods and Computer Programming	3	1	-	80	20	20	120	4
6.	Civil Engineering	**320556 (20)**	Engineering Hydrology	2	1	-	80	20	20	120	3
7.	Civil Engineering	**320561 (20)**	Structural Analysis Lab	-	-	3	40	-	20	60	2
8.	Civil Engineering	**320562 (20)**	Geotech Engineering – I Lab	-	-	3	40	-	20	60	2
9.	Civil Engineering	**320563 (20)**	Transportation Engineering – II Lab	-	-	3	40	-	20	60	2
10.	Civil Engineering	**320564 (20)**	Numerical Methods and Computer Programming Lab	-	-	3	40	-	20	60	2
11.	Humanities	**300565 (46)**	Personality Development	-	-	2	-	-	20	20	1
12.	Civil Engineering	**320566 (20)**	*Practical Training Evaluation and Library	-	-	1	-	-	20	20	1
Total				**19**	**6**	**15**	**640**	**120**	**240**	**1000**	**35**

L: Lecture **T:** Tutorial **P:** Practical
ESE: End Semester Examination **CT:** Class Test **TA:** Teacher's Assessment

**** Industrial Training of eight weeks is mandatory for B.E. student. It is to be completed in two parts. The first part will be in summer after IV sem. after which students have to submit a training report which will be evaluated by the college teachers during B.E. V sem.***

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**V**
Subject:	**Structural Analysis – II**	Code:	**320551(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective of the Subject:

1. To learn the methods which are applied to analyse indeterminate structures.
2. To gain the expertise in analysis of indeterminate beams and rigid frames.
3. To develop professional skill in analyzing indeterminate pin jointed structures.
4. To learn to draw influence line diagrams for stress functions in indeterminate beams which may be useful for moving the maximum values of the stress functions.

Outcomes of the Subject:

1. Capable of analyzing different kinds of structures such as determinate, indeterminate, rigid jointed or pin-jointed plane frames.
2. Capable of understanding about the suitable method for a given structure.
3. Capable of drawing influence line diagram for determinate and indeterminate beams and to find out maximum values of stress function.
4. Ready to proceed for designing of analysed structure.

UNIT I **Method of three moments:** Indeterminate beams, Principle of superposition. Analysis by consistent deformation method, Theorem of three moments, shear force and bending moment diagrams, sinking of support.

UNIT II **Method of strain energy:** Strain energy of linear elastic systems due to axial load, bending moment and torsion. Minimum strain energy and Castigliano's second theorem, strain energy application to indeterminate beams and rigid frames. Application of Castigliano's theorem of minimum strain energy to externally and internally indeterminate pin-jointed plane frames, yielding of supports, stresses due to lack of fit.

UNIT III **Method of Moment distribution:** Moment Distribution Method, Application to indeterminate beams and rigid frames without sway and with sway problem.

UNIT IV **Method of Slope deflection and Column analogy:** Slope deflection method, Application to indeterminate beams and rigid frames without sway and with sway problem. Basics of Column analogy method and application for fixed beams.

UNIT V **Influence lines by Muller Breslau Principle:** Qualitative and quantitative influence lines of indeterminate beams by Muller Breslau Principle, its use and its application to propped Cantilevers and continuous beams.

Text Books:

1. SMTS – II Theory of Structures – Punmia B.C., A. K. Jain, A. K. Jain (Laxmi Publications)
2. Fundamentals of Structural Analysis (with Computer Analysis and Applications) – Sujit Kumar Roy and Subrata Chakrabarty (S. Chand)
3. Basic Structural Analysis – C.S. Reddy (Tata McGraw Hill)

Reference Books:

1. Intermediate Structural Analysis – Wang. C.K. (Tata McGraw Hill)
2. Fundamentals of Structural Analysis – Harry H. West and Louis F. Geschwindner (Wiley India)
3. Theory of Structures (Vol. I & Vol. II) – G. Pandit, S. Gupta & R. Gupta (Tata McGraw Hill)
4. Structural Analysis – Hibbeler (Pearson Education)
5. Fundamentals of Structural Mechanics and Analysis – M. L. Gambhir (PHI Learning)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**V**
Subject:	**Structural Engineering Design – I**	Code:	**320552(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective of the Subject:

1. To educate the student about the concept of reinforced cement concrete and different method of design of reinforced concrete.
2. To educate the student about concept of working stress method to analysis and design of beams.
3. To educate the student about concept of limit state method to analysis and design of beams, slabs and columns.
4. To educate the student about analysis and design of footings and staircases by limit state method.

Outcomes of the Subject:

Understand the importance of reinforced concrete structure.
Understand the different method of analysis and design of reinforced concrete structures.
Understand the procedure of analysis and design of beams by working stress and limit state method.
Understand the procedure of analysis and design of other elements such as slabs, columns, footings and staircases.

Note: 1. All designs should be as per latest version of code (IS 456: 2000)
2. IS 456: 2000 is permitted in the Examination Hall.
3. Design Aids (SP 16: 1980) are **not to be allowed** in the examination.

UNIT I **Basis of working stress method:** Properties of Concrete and reinforcing steel, stress-strain curves, permissible stresses, modular ratio, loads on structure, Basis for design by working stress method. Analysis and design of singly reinforced and doubly reinforced sections by working stress method, shear in beams.

UNIT II **Limit State Method – Rectangular Beams:** Introduction to limit state method, characteristic loads, partial safety factor, limit state of flexure – assumptions, stress block parameters, neutral axis, analysis and design of singly and doubly reinforced section, shear in beams, bond and development length, design of lintels.

UNIT III **Limit State Method – T-Beams and Slabs:** Properties of T-section, moment of resistance and design of singly reinforced T-beam. Dead loads, imposed loads, thickness of slabs, modification factors, effective span, reinforcement in slab, design of one way slab and two way slabs.

UNIT IV **Limit State Method – Columns:** Axially loaded short columns, minimum eccentricity, longitudinal and transverse reinforcement, effective length of column, safe load on columns, circular columns, Pu – Mu interaction curves, combined axial load and uni-axial bending, combined axial load and bi-axial bending.

UNIT V **Limit State Method – Staircases and Column Footings:** Design of stairs – dog legged stair, open newel stair.
General principle of design of reinforced concrete footing, proportioning of footings, edge thickness, depth of footing, design of isolated column footings – square and rectangular footings.

Text Books:

1. Limit State Design of Reinforced Concrete – B. C. Punmia, A. K. Jain and A. K. Jain (Laxmi Publications)
2. Limit State Theory and Design of Reinforced Concrete (IS:456-2000) – V. L. Shah and S. R. Karve (Structures Publications, Pune)
3. Reinforced Concrete Design – S. U. Pillai and D. Menon (Tata McGraw Hill)

Reference Books:

1. Relevant IS codes IS: 456:2000, IS 875, Part 1, 2
2. Reinforced Concrete Structures – Dayaratam P. (Oxford and IBH Publishing Co.)
3. Reinforced Concrete Limit State Design – Jain, A.K. (Nem Chand and Bros. Roorkee)
4. Fundamentals of Reinforced Concrete Design – M. L. Gambhir (PHI Learning)
5. Design of Reinforced Concrete Structures – M. L. Gambhir (PHI Learning)
6. Design Aids for Reinforced Concrete to I.S.-456-1978 – SP-16, 1980 (Bureau of Indian Standards, New Delhi)

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**V**
Subject:	**Geotech Engineering – I**	Code:	**320553 (20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective of the Subject:

- To provide basic knowledge about Geotechnical Engineering, soil formation, index properties of soil, physical and engineering properties of soil.
- To know about the types of soil according their classification, classification system, field identification, study of effective stress, capillary seepage force, etc.
- How to measure the compaction and permeability of soil by lab experiments theoretically uses of Darcy law. Two dimensions flow and develop flow net and characteristics.
- To know about stresses due to applied load a soil mass, consolidation and their factor one dimensional consolidation as per Terzaghi theory
- To find shear strength in soil with the help of Mohr circle. How shear strength can be determine in laboratory, soil exploration.

Outcomes of the Subject:

- Know about soil and development of soil mechanics and soil formation and characteristic of soil.
- Field identification, soil classification system.
- Study the lab experiments and simulations of experiment result with the theoretical characteristic of soil.
- Study of different theory Newmart Charts, Westergaard and Boussinesq equation.
- Able to find at experiment, shear strength of soil and different method of soil exploration.

UNIT I **Introduction:** Introduction to Geotechnical Engineering; Unique nature of soil; Soil formation and soil types, inter relationship of soil, soil mechanics and geotechnical engineering, aim and scope of soil mechanics. Index Properties of Soil Basic definitions; phase relations; physical and engineering properties of soil, soil grain and properties coarse and fine grained soils, Stoke's law, method of fine grained analysis.

UNIT II **Soil Classification and Effective Stress:** Indian standard soil classification system, Purpose of soil Classification, Different System of soil Classification, Field Identification, Principal of Effective Stress and Related Phenomena, Types of soil moisture, principal of effective stress; capillarity; seepage force and quicksand condition;

UNIT III **Compaction, Permeability and Seepage Analysis of Soil:** Clay mineralogy, soil structure, compaction theory, laboratory compaction tests, method of compaction control, permeability, one dimensional flow, permeability of soil, Darcy's law, laboratory methods of determination, pumping out tests for field determination of permeability, seepage through soils, two-dimension flow problems, confined flow and unconfined flow, flow net and their characteristics, exit gradient and failure due to piping, criteria for design of filters.

UNIT IV **Stresses due to Applied Loads and Consolidation:** Stresses due to applied Loads, Boussinesq equation of vertical pressure under concentrated loads, rectangularly loaded area, circular Loaded Area Newmart's Chart, Westergaard's equation, compressibility, effects of soil type, stress history and effective stress on compressibility, consolidation, factors affecting consolidation and compressibility parameters. Normally consolidated and over consolidated soils, different forms of primary consolidation equation – transient flow condition, Terzaghi theory of one-dimensional consolidation and time rate of consolidation.

UNIT V **Shear Strength and Soil Exploration:** Introduction, stress at a point and Mohr's stress circle; Mohr-Columb Failure criterion: Laboratory tests for shear strength determination; shear strength parameters; UU, CU and CD tests and their relevance to field problems; Shear strength characteristics of normally consolidated and reconsolidated clays; Shear strength Characteristics of sands, Soil Exploration, Various Method of field Exploration, Undisturbed Soil Sampling equipments and Field test (Static and Dynamic Penetration Test, PLT), cyclic plate load test and modern electronic test of site characterization.

Text Books:

1. Soil Mechanics and Foundations – B.C. Punmia, A. K. Jain, A. K. Jain (Laxmi Publication)
2. Soil Engineering in Theory and Practice (Vol-II) – Alam Singh (Asia Publishing House)

Name of Reference Books:

1. Soil Mechanics and Foundation Engineering – S.N. Murthy (Dhanpat Rai Publications)
2. Basic and Applied Soil Mechanics – Gopal Ranjan and Rao A.S.R. (New Age International)
3. Design Aids in Soil Mechanics and Foundation Engineering – S.R. Kaniraj (Tata McGraw Hill)
4. Geotechnical Engineering Principles and Practice – D. P. Coduto (Prentice Hall of India)
5. Soil Mechanics and Foundation Engineering – Garg S.K. (Khanna Publishers)
6. Soil Mechanics and Foundation Engineering – Purushothama Raj (Pearson Education)
7. Text Book of Geotechnical Engineering – I. H. Khan (PHI Learning)
8. Foundation Engineering – R. B. Peck, W. E. Hanson, and T. H. Thornburn (John Wiley)
9. Foundation Design and Construction – M. J. Tomlinson (Pearson Education)

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**V**
Subject:	**Transportation Engineering – II**	Code:	**320554 (20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objectives of the Subject:

1. To educate the students on the various means of transportation i.e., Railway Engineering, Bridge Engineering, Tunnel Engineering and Harbour Engineering.
2. To expose the students to the concepts of Geometric design of Railway Engineering.
3. To expose the students to the concepts of Bridge Engineering.
4. To educate the students to the concepts of Tunnel and Harbour Engineering.

Outcomes of the Subject:

1. A person with broad vision and knowledge of different means of Transportation Engineering.
2. The students will be able to make safe design for railway track with high speed.
3. The students will be able to know, what are the selection of site and collection of data for Bridge Design.
4. The students will be able to understand methods of construction of Tunnel and Harbour.

UNIT I **Railway Engineering:** Railway track cross-section, coning of wheels, rail cross-section, weight of rail, length of rail, wear of rails, creep of rails, rail joints and welding of rail, sleepers, various types, spacing and density fastenings, ballasts.

UNIT II **Railway Geometrics:** Grading, cant and cant deficiency, transition curves, widening of gauges on curves. Point and crossing, design of turn outs various types of track junctions, signaling and interlocking, signals, control of movements of trains.

UNIT III **Bridge Engineering:** Bridge site investigation and planning, selection of bridge site, alignment, collection of bridge design data, economic span, scour depth, depth of foundation afflux, clearance, free board.

UNIT IV **Tunnel Engineering:** Consideration in tunneling shape and size, methods of tunnel, constructions, tunneling in soft soil and rocks, lining of tunnels, ventilation, drainage of tunnels.

UNIT V **Harbour Engineering:** Harbour layout, harbor works, break water jetties, wharves, piers and berthing facilities, port facilities, docks, transit shed and ware houses.

Text Books:

1. Railway Engineering – S.C. Saxena and S.P. Arora, "A textbook of Railway Engineering", (Dhanpat Rai Publications)
2. Railway Engineering – S.C. Rangwala, "Railway Engineering", (Charotar Publishing House Pvt. Ltd.)
3. Bridge Engineering – S.P. Bindra, "Principles and practice of bridge engineering", (Dhanpat Rai Publications)
4. Tunnel Engineering – S.C. Saxena (Dhanpat Rai Publications)
5. Harbour Engineering – R. Srinivasan (Charotar Publishing House Pvt. Ltd)

Reference Books:

1. Tunnel and Harbour – Seetharaman S. (Umesh Publication)
2. Harbour Engineering – R. Srinivasan (Charotar Publishing House Pvt. Ltd.)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**V**
Subject:	**Numerical Methods & Computer Programming**	Code:	**320555 (20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective of the Subject:

1. To know the importance of numerical methods and computer programming in Civil Engineering.
2. To be familiar with various features of C++ language.
3. To prepare C++ programs of simple civil engineering applications.
4. To prepare C++ programs of simple numerical methods useful in various civil engineering applications.

Outcomes of the Subject:

1. Understand the importance of numerical methods and programming language in civil engineering applications.
2. Have a clear idea about C++ programming language.
3. Develop skill for preparing C++ programs for simple as well as complex C++ programs.
4. Customize software's as per the requirements.

UNIT I **Basic Concepts of C++ Programming Language:** Constants and variables, arithmetic operators, integer mode and real mode operations, arithmetic expressions, assignment statements, logical operations, input/output statements, loop statements, break and continue statements, go to statement, nesting of loops, file handling. Simple Civil engineering applications.

UNIT II **Functions and Arrays:** *Functions:* Necessity of functions, defining functions, calling functions, passing values between functions. Function Overloading with various data types, Simple Civil engineering applications. *Arrays:* Array initialization, inputting and outputting arrays, passing arrays to functions. Introduction to structures and classes. Programming of matrix operations, programming of matrix inversion. Simple Civil engineering applications.

UNIT III **Graphics Programming:** Introduction, Graph Initialization and Closing Routine, Line and Polygon selection routines, Colour selection routines, Simple civil engineering applications.

UNIT IV **Application to Linear Algebra:** Solution of simultaneous linear algebraic equations by Gauss elimination and Gauss Jordan methods. Curve Fitting and Correlation Index. C++ programs for above.

UNIT V **Application to differential equations:** Backward, Forward and Central Differences, Application of difference relations in the solution of partial differential equations. Numerical Solution of ordinary differential equations by Runge-Kutta and Predictor-Corrector methods. C++ programs for above.

Text Books:

1. Programming with C++, D. Ravichandran (Tata McGraw Hill)
2. Let Us C++ – Yeshwant Kanitkar (BPB Publications)
3. Numerical Methods in Engineering and Science – Dr. B.S. Grewal (Khanna Publishers)

Reference Books:

1. Problem Solving with C++ – Savitch (Addison Wesley Publications)
2. Programming in C and PC Applications – Raj Gopalan (Vikas Publishers)
3. Computer Graphics (C-Version) – Hearnt and Beaker (Pearson Publications)
4. Principles of Interactive Computer Graphics – Newman and Sproull (Tata McGraw Hill)
5. Numerical Methods for Engineering – Chopra and Kanale (Tata McGraw Hill)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**V**
Subject:	**Engineering Hydrology**	Code:	**320556 (20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objectives of the Subject:

1. To understand basic concepts of hydrology and hydrologic cycle
2. To understand the concepts of precipitation and its measurement.
3. To learn about runoff and estimation of runoff.
4. Be familiar with the concepts of hydrograph.
5. To understand the concepts of ground water.

Outcomes of the Subject:

1. Students are able to understand the concepts of hydrologic cycle and are able to explain the practical application of hydrology.
2. Students should be able to analyze the rainfall data.
3. Students can explain the effects of infiltration on runoff.
4. Students should be able to develop the unit hydrograph.
5. Students can estimate the ground water flow.

UNIT I **Introduction:** Definition and scope, Hydrology in relation to water resources development, Hydrologic Cycle, The necessity for hydrologic data, the global water budget, Practical applications. Hydrometeorology Introduction, constituents of atmosphere, the weather and the atmosphere, the general circulation, air masses and fronts, climate and weather seasons in India.

UNIT II **Precipitation:** Forms of precipitation, measurement of precipitation, Recording and Non-recording type of rain gauges, errors in measurement of rainfall. Location of rain gauge stations, analysis and interpretation of rainfall data, Average depth of rainfall over area, Probable maximum precipitation (PMP).

UNIT III **Infiltration and Run off:** Introduction, factors affecting in filtration, measurement of infiltration, infiltrometers, infiltration equations, infiltration indices, effect of infiltration on runoff and recharge of ground water, Runoff, components of runoff, estimation of runoff, calculations by infiltration method, rainfall-runoff relationship, rational method of estimating runoff, Basin yield.

UNIT IV **Hydrograph Analysis:** Introduction, characteristics of the hydrograph, Effect of rainfall distribution on the shape of hydrograph, hydrograph separation, Unit hydrograph, Derivation of the unit hydrograph, Unit hydrograph from the complex storms-hydrograph, applications of Unit hydrograph.

UNIT V **Ground Water:** Introduction, occurrence of ground water, aquifer parameters, ground water movement, Darcy's Law, permeability, steady and unsteady flow to wells in Confined and Unconfined aquifers, ground water exploration, Safe yield, Pumping test and recuperation test.

Text Books:

1. Engineering Hydrology – K. Subramanya (Tata McGraw Hill)
2. A Text Book of Hydrology – Dr. P. Jaya Rami Reddy (Laxmi Publications)

Reference Books:

1. Hydrology Principles and Analysis – H.M. Raghunath (New Age International Publication)
2. Applied Hydrology – Ven Te Chow, David R. Maidment, Larry W. Mays (McGraw Hill)
3. Applied Hydrology – Linsely R.K. Kohler, M.A. and J.L.H. Paulhus (McGraw Hill)
4. Hydrology for Engineers and Planners – Cassidy W.C. (Iowa State University Press)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**V**
Subject:	**Structural Analysis Laboratory**	Code:	**320561(20)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

Experiments to be performed:

1. To determine the flexural rigidity (EI) for a given beam
2. To verify the Maxwell's theorem of reciprocal deflection
3. To determine the vertical deflections of a variety of curved bars.
4. To obtain the horizontal deflection and deformed shape of portal frames with different end conditions.
5. To determine the strain in an externally loaded beam with the help of digital strain indicator.
6. Analysis of determinate beams on a Standard Structural Analysis Package such as SAP2000.
7. Analysis of indeterminate beams on a Standard Structural Analysis Package such as SAP2000.
8. Analysis of determinate pin-jointed frames on a Standard Structural Analysis Package such as SAP2000.
9. Analysis of indeterminate pin-jointed frames on latest version of a Standard Structural Analysis Package such as SAP2000.
10. Analysis of determinate rigid frames on latest version of a Standard Structural Analysis Package such as SAP2000.
11. Analysis of indeterminate rigid frames on latest version of a Standard Structural Analysis Package such as SAP2000.
12. To draw influence lines for determinate beams on latest version of a Standard Structural Analysis Package such as SAP2000.
13. To draw influence lines for indeterminate beams on latest version of a Standard Structural Analysis Package such as SAP2000.
14. Introduction to the latest version of a Standard Finite Element Analysis Package such as ANSYS.
15. Analysis of a plate with a hole on the latest version of a Standard Finite Element Analysis Package such as ANSYS.

List of Equipments / Machine Required:

1. Elastic properties of beam apparatus
2. Maxwell's law of reciprocal deflection apparatus
3. Universal frame with variety of curved bars
4. Universal frame with variety of portal frames
5. Digital Strain Indicator
6. Dial gauges for measuring deflections
7. Weights and hangers to apply loads
8. Latest Release of Software Package SAP2000 (Computers & Structures Inc., USA)
9. Latest Release of Software Package ANSYS (ANSYS Inc., USA)

Recommended Books:

1. Reference Manual of Respective Software
2. Verification Manual of Respective Software

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**V**
Subject:	**Geotech Engineering – I Laboratory**	Code:	**320562(20)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

Experiments to be performed:

1. To determine the mass density of soil by core cutter method.
2. To determine the specific gravity of soil sample by pycnometer method.
3. To determine the water content of soil (%) by oven dry method.
4. To determine in situ dry density of soil by sand replacement method.
5. To determine the particle size distribution of a soil by dry mechanical analysis (sieve analysis).
6. To determine the liquid limit of a soil sample.
7. To determine the plastic limit of a soil sample.
8. To determine the shrinkage limit of soil sample.
9. Study of permeability by falling head and constant head methods.
10. To determine the grain size distribution by wet mechanical analysis (Hydrometer apparatus).
11. To determine the liquid limit of soil sample by static cone penetrometer method.
12. Study of cyclic plate load test.
13. Study of various field control test method.
14. Study of Skempton's pore pressure parameters.
15. Determination of density for contaminated soil.

List of Equipments / Machine Required:

1. Core Cutter Mould
2. Pycnometer of capacity 500 ml and 1000 ml
3. Small and Big Soil Container
4. Hydrometer Apparatus
5. Oven
6. Liquid Limit Apparatus
7. Shrinkage Limit Apparatus
8. Constant Head Permeability Test Apparatus
9. Following Head Permeability Test Apparatus
10. Mechanical Sieve Analysis (Complete Sets of Sieves)
11. Static Cone Penetrometer Test Apparatus
12. Skempton's Core Pressure Apparatus
13. Soil Sampling Tube, Piston Tube
14. Rammer for Compaction
15. Soil Extractor
16. Measuring Jar Cylinder (1000 CC)

Name of Text Books:

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

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**V**
Subject:	**Transportation Engineering – II Laboratory**	Code:	**320563(20)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

Experiments to be performed:

1. Gradation of road aggregates for Grade-I.
2. Abrasion value and Impact value of Grade-I road aggregate.
3. Gradation of road aggregates for Grade-II.
4. Abrasion value and Impact value of Grade-II road aggregate.
5. Gradation of road aggregates for Grade-III.
6. Abrasion value and Impact value of Grade-III road aggregate.
7. Mix Design for Bituminous concrete.
8. Marshal stability test for Bituminous concrete.
9. Study of joints in rigid pavement.
10. Study of signal design.
11. Study of parking design.
12. Study of Origin and Destination survey.
13. Study of signaling and interlocking of railway tracks.
14. Study of points and crossing.
15. Study of speed volume data (30^{th} peak hourly volume).

List of Equipments / Machine Required:

1. Los Angeles Machine
2. Impact Value Testing Machine
3. Marshal Stability Test Machine
4. Data required for parking, signaling, speed volume study, etc.

Name of Text Books:

1. Highway Engineering – Justo & Khanna (Khanna Publishers)
2. Highway Engineering Manual – Justo & Khanna (Khanna Publishers)
3. Highway Capacity Manual 1999

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**V**
Subject:	**Numerical Methods & Computer Programming Laboratory**	Code:	**320564(20)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

Experiments to be performed:

1. A C++ program for determination of standard deviation of any number of observations.
2. A C++ program for determination of correlation index.
3. A C++ program to perform regression analysis.
4. A C++ program to add any desired number of matrices.
5. A C++ program to multiply any desired number of matrices.
6. A C++ program to determine the inverse of a matrix.
7. A C++ program for solution of simultaneous linear algebric equations by Gauss elimination method.
8. A C++ program for solution of simultaneous linear algebric equations by Gauss Jordan method.
9. A C++ program for solution of simultaneous linear algebric equations by Matrix Inversion method.
10. A C++ program for numerical solution of ordinary differential equations by Runge-Kutta method.
11. A C++ program for numerical solution of ordinary differential equations by Predictor-Corrector method.
12. A C++ program for the computation of area of any section by trapezoidal rule.
13. A C++ program for the computation of area of any section by Simpson's rule.
14. Graphics programming for the generation of line of different styles.
15. Graphics programming for the generation of a rectangle, circle, ellipse of given dimensions.

List of Equipments / Machine Required:

1. PC system.
2. Turbo C++ compiler.

Recommended Books:

1. Let us C++ – Yeshwant Kanitkar (BPB Publications)
2. Problem Solving with C++ – Savitch (Addison Wesley Publication)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Engineering**		
Branch:	**Common to All Branches**	Semester:	**V**
Subject:	**Personality Development**	Code:	**300565 (46)**
No. of Lectures:	**2/Week**	Tutorial Period:	**NIL**
Total Marks in ESE:	**NIL**	Marks in TA:	**20**
Minimum number of Class Tests to be conducted:	**Two**		

Objective: The course is introduced to develop one's outer and inner personality tremendously and enrich the abilities to enable one to meet the challenges associated with different job levels. Personality Development is essential for overall development of an individual apart from gaining technical knowledge in the subject.

Course Objectives

Upon completion of this course, the student shall be able

- To understand the concept of personality and image;
- To develop leadership, listening and interacting skills;
- To develop attitudinal changes;
- To develop decision-making qualities; and
- To communication skill.

UNIT I **Personality concepts:** What is Personality – its physical and psychic aspects. How to develop a positive self-image. How to aim at Excellence. How to apply the cosmic laws that govern life and personality. How to improve Memory – How to develop successful learning skills. How to develop and effectively use one's creative power. How to apply the individual MOTIVATORS that make you a self-power personality.

UNIT II **Interpersonal Skills:** Leadership: Leaders who make a difference, Leadership: your idea, What do we know about leadership? If you are serious about Excellence. Concepts of leadership, Two important keys to effective leadership, Principles of leadership, Factors of leadership, Attributes. Listening: Listening skills, How to listen, Saying a lot- just by listening, The words and the music, How to talk to a disturbed person, Listening and sometimes challenging. How to win friends and influence people, How to get along with others. How to develop art of convincing others. How can one make the difference. How to deal with others particularly elders. Conflicts and cooperation.

UNIT III **Attitudinal Changes: Meaning of attitude,** benefits of positive attitudes, How to develop the habit of positive thinking.

Negative attitude and wining: What is FEAR and how to win it. How to win loneliness. How to win over FAILURE. How to win over PAIN. How to win over one's ANGER and others anger. What is stress and how to cope up with it? The art of self-motivation. How to acquire mental well-being. How to acquire physical well-being.

UNIT IV **Decision Making:** How to make your own LUCK. How to plan goals/objectives and action plan to achieve them. How to make RIGHT DECISION and overcome problems. How to make a Decision. Decision making: A question of style. Which style, when? People decisions: The key decisions. What do we know about group decision making? General aids towards improving group decision making.

UNIT V **Communication Skills: Public Speaking:** Importance of Public speaking for professionals. The art of Speaking - Forget the fear of presentation, Symptoms of stage fear, Main reason for speech failure, Stop failures by acquiring Information; Preparation & designing of speech, Skills to impress in public speaking & Conversation, Use of presentation aids & media.

Study & Examination: How to tackle examination, How to develop successful study skills.

Group discussions: Purpose of GD, What factors contribute to group worthiness, Roles to be played in GD.

Course Outcomes:

- The students will be able to develop inner and outer personality exposure;
- The students will be able to develop effective leadership qualities and interacting skills;
- The students will be able to develop positive attitude, motivating skills and develop winning philosophies;
- The students will be able to develop decision-making tools; and
- The students will be able to develop group presentation, public speaking and impressive conversation.

Text Books:

1. Basic Managerial Skills for all by E. H. McGrawth, prentice Hall India Pvt. Ltd., 2006
2. Basic Employability Skills by P. B. Deshmukh, BSP Books Pvt. Ltd., Hyderabad, 2014

Reference Books:

1. How to Develop a Pleasing Personality by Atul John Rego, Better Yourself Books, Mumbai, 2000
2. How to Succeed by Brain Adams, Better Yourself Books, Mumbai, 1969
3. Personality: Classic Theories & Modern Research; Friedman ; Pearson Education, 2006
4. How to Win Friends and Influence People by Dale Carnigie, A. H. Wheeler 2006

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY

BHILAI (C.G.)

Scheme of Teaching & Examination

B.E. (VI Semester) Civil Engineering

S. No.	Board of Study	Subject Code	Subject	Periods per Week			Scheme of Examination			Total Marks	Credit L+(T+P)/2
				L	T	P	ESE	CT	TA		
1.	Civil Engineering	**320651 (20)**	Structural Engineering Design-II	4	1	-	80	20	20	120	5
2.	Civil Engineering	**320652 (20)**	Geotech Engineering-II	4	1	-	80	20	20	120	5
3.	Civil Engineering	**320653 (20)**	Environmental Engineering-I	3	1	-	80	20	20	120	4
4.	Civil Engineering	**320654 (20)**	Concrete Technology	3	1	-	80	20	20	120	4
5.	Civil Engineering	**320655 (20)**	Construction Planning	2	1	-	80	20	20	120	3
6.	*Refer Table-1*	*Professional Elective-I*		3	1	-	80	20	20	120	4
7.	Civil Engineering	**320661 (20)**	Structural Engineering Lab	-	-	3	40	-	20	60	2
8.	Civil Engineering	**320662 (20)**	Geotech Engineering-II Lab	-	-	3	40	-	20	60	2
9.	Civil Engineering	**320663 (20)**	Environmental Engineering-I Lab	-	-	3	40	-	20	60	2
10.	Civil Engineering	**320664 (20)**	Concrete Technology Lab	-	-	3	40	-	20	60	2
11.	Management	**300665 (76)**	Managerial Skills	-	-	2	-	-	40	40	1
12.			Library	-	-	1	-	-	-	-	-
Total				**19**	**6**	**15**	**640**	**120**	**240**	**1000**	**34**

Table – 1: Professional Elective - I

S. No.	Board of Study	Subject Code	Subject
1.	Civil Engineering	**320671 (20)**	Modern Construction Materials
2.	Civil Engineering	**320672 (20)**	Composite Materials
3.	Civil Engineering	**320673 (20)**	Advanced Strength of Materials
4.	Civil Engineering	**320674 (20)**	Modern Surveying Techniques
5.	Civil Engineering	**320675 (20)**	Remote Sensing and its Applications
6.	Civil Engineering	**320676 (20)**	GIS and its Applications
7.	Civil Engineering	**320677 (20)**	Computational Hydraulics
8.	Civil Engineering	**320678 (20)**	Instrumentation in Fluid Mechanics
9.	Civil Engineering	**320679 (20)**	Water Power Engineering
10.	Civil Engineering	**320680 (20)**	Earthquake Engineering

L: Lecture **T:** Tutorial **P:** Practical
ESE: End Semester Examination **CT:** Class Test **TA:** Teachers' 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.

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Structural Engineering Design - II**	Code:	**320651(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Note: 1. All designs should be as per latest version of code (IS: 800-2007)

2. IS: 800-2007 and Steel Tables are permitted in Examination Hall.

Objectives of the Subject:

1. To know about the merits of steel structures.
2. To know about shapes and grades of structural steel available.
3. To know about the different methods of design and the advantages of limit state design over other methods.
4. To understand the behavior of structural steel under tension, compression and flexure.

Outcomes of the Subject:

1. To develop ability to select adequate shape and grade of structural steel.
2. To understand the basis of economical and safe design of steel structures.
3. To develop ability of choosing proper fastener for a particular joint.
4. To develop the ability to design structural steel elements by Limit State Method.

UNIT I **Materials and Methods:** Types of Structural Steel, Physical and Mechanical Properties, Advantages of steel as a structural material, Rolled Sections - Tapered Flange and Parallel Flange, Built up sections, Convention for Member Axes. Plastic Theory, Shape factor, Methods of design, Limitations of Working stress and Plastic design methods, Advantages of Limit State Design, Limit States of Strength and Serviceability, Partial Safety Factors, Loads and Load Combinations, Geometrical Properties, Classification of Cross Sections, Maximum effective slenderness ratio.

UNIT II **Fasteners:** Location details of fasteners, Bearing type bolts, Friction Grip type Bolting, Welds and Welding, Advantages and Disadvantages of Welded Connections, Lap and Butt Joints, Truss Joint Connections by bolts and welds.

UNIT III **Tension Members:** Design Strength due to Yielding of Gross Section, Rupture of Critical Section, Block Shear, Design of Axially Loaded Tension Members, Steel Angles under Tension.

UNIT IV **Compression Members:** Design Strength, Effective length of compression members, Design of Axially loaded compression members, Steel Angles under Compression, Design of Column bases under axial load, Laced Columns, Battened columns.

UNIT V **Flexural Members:** Design Strength in Bending (Flexure), Effective length for lateral torsional buckling, Shear, Design of Laterally Supported and Laterally Unsupported Beams with unstiffened webs.

Text Books:

1. Design of Steel Structures - N. Subramanian (Oxford University Press)
2. Limit State Design of Steel Structures – S. K. Duggal (Tata McGraw Hill)

Reference Books:

1. Indian Standard – General Construction in Steel –Code of Practice (3rd Revision) (IS:800 – 2007)
2. Design of Steel Structures – K. S. Sai Ram (Pearson Education)
3. Structural Steel Design : LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education)
4. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning)
5. Limit State Design of Steel Structures (IS:800-2007) – V. L. Shah, V. Gore (Structures Publications)
6. Design Manual for Designing Steel Structures according to New IS:800, Publication Number INS/PUB/114 – Institute for Steel Development and Growth, Kolkata.
7. Teaching Resource for Structural Steel Design, Vol. I – III, Publication Number INS/PUB/051, Institute for Steel Development and Growth, Kolkata.

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Geotech Engineering - II**	Code:	**320652(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective of the Subject:

1. To know about the stability of slopes and stability analysis.
2. To study about the earth pressure in different condition of soil, Coulomb earth pressure theories, earthquake loading.
3. To study about the types of shallow foundation basic for design, bearing capacity of soil and settlement of foundation.
4. The knowledge about another types of foundation like well and pile foundation and their design criterion.
5. Know about problems associated with expansive soils and contaminated soils and their remedial measures.

Outcomes of the Subject:

1. To know how to achieve stability of soil against gravitational force and seepage of water infinite slope concept of factor of safety.
2. Design of earth structure and their stability against soil pressure.
3. Design of shallow foundation and their failure how to measure bearing capacity of soil, effect of settlement of foundation.
4. Design of deep foundation selection of type of deep foundation design criterion for pile foundation.
5. To learn about the effects of expansive soils and contaminated soils on foundation.

UNIT I **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 II **Earth Pressure:** Earth Pressure at rest, active and passive earth pressure, computations using Rankine's and Coulomb's earth pressure theories, Rabhann's and Coleman's graphical method, additional earth pressure due to surcharge and earthquake loading.

UNIT III **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 IV **Well and Pile Foundations:** 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 V **Expansive Soil and Contaminated Soil:** Foundations on expansive soil, identification of expansive soil, problems associated with expansive soil, design consideration of foundation on expansive soil, Types and sources of sub surface contamination, contaminant transport, effects of sub surface contamination, detection of polluted zones.

Text Books:

1. Soil Mechanics and Foundations – B.C. Punmia, A. K. Jain, A. K. Jain (Laxmi Publication)
2. Soil Engineering in Theory and Practice (Vol-II) – Alam Singh (Asia Publishing House)

Reference Books:

1. Basic and Applied Soil Mechanics (Revised Edition) – Gopal Rajan and Rao A.S.R. (New Age)
2. Foundation Engineering – R. B. Peck, W. E. Hanson, and T. H. Thornburn (John Wiley)
3. Foundation Design and Construction – M. J. Tomlinson (Pearson Education)
4. Foundation Analysis and Designing – J.E. Bowles (McGraw Hill, New Delhi)
5. Physical Methods of Soil Characterisation – J. Behari (Narosa Publishing Hall, New Delhi)
6. Soil Mechanics and Foundation Engineering – Purushothama Raj, Pearson Education
7. Text Book of Geotechnical Engineering – I. H. Khan (PHI Learning)
8. Foundation Design – Principles and Practices – D. P. Coduto (Pearson Education)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Environmental Engineering - I**	Code:	**320653(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective:

1. To provide fundamental awareness about the water sources, population forecasting, water quality.
2. To develop an interest in pursuing the subject for P.G. studies because environmental pollution and its management is a critical topic of the hour.
3. To develop skills of designing a water treatment plant.
4. Developing a professional skill for design of water distribution system and environmental problems related to civil engineering.

Outcome:

1. Provide deep understanding about planning, designing, construction and monitoring of a water treatment plant as per a city's water demand.
2. Students possess the ability to design an analysis the complexities of water distribution system.
3. Ability to give meaningful result to the water supply project they get in hand.
4. Have a appreciation for the scope, complexity and requirement to treat the subject as the need of the hour and has a positive attitude to earth environment and its protection.

UNIT I **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 II **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 III **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 IV **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 V **Air Pollution:** Introduction, causes, sources, characteristics, effects of air pollution on plants, humans, animals and materials and atmosphere, air pollution control methods and equipment.

Text Books:

1. Water Supply Engineering – S.K. Garg (Khanna Publication).
2. Water Supply Engineering – B.C. Punmia, A. K. Jain, A. K. Jain (Laxmi Publications)

Reference Books:

1. Environmental Engineering – Peavy and Rowe (Tata McGraw Hill).
2. Water Supply and Sanitary Engineering – G.S. Birdi (Dhanpat Rai Publications).
3. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
4. Environmental Science and Engineering – Henry and Heinke (Pearson Education)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Concrete Technology**	Code:	**320654(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective of the Subject:

1. To develop Fundamental knowledge of properties of concrete and its ingredients.
2. To acquire an interest in concrete technology and admixture and its filled requirements.
3. Developing a good skill of various methods of concrete making, placing and special formwork.
4. Developing a professional skill of concrete mix design by IS Code Method.

Outcomes of the Subject:

1. Ability to measure quality of concrete making materials.
2. Ability to design concrete mixes according to IS, ACI, BS Code methods.
3. Capable of understanding field requirements of various types of concrete.
4. Understanding the process of selection of materials and testing, uses of admixtures, professional practices in ready mix concrete.

UNIT I **Concrete Making Materials:** Hydration of cement, Structure of hydrated cement, General Purpose cements, Special purpose cements, Blended cements, Classification of Aggregates, Properties, Grading requirements, Methods of combining aggregates, Surface index, specified grading, Alkali aggregate reaction, Quality of mixing and curing water.

UNIT II **Admixtures and Fresh Concrete:** Chemical admixtures – Functions of Admixtures, Classification of Admixtures, Mineral Additives, effects on concrete properties. Workability, Factors affecting workability, Measurement of Workability, Requirements of Workability, Segregation, Bleeding

UNIT III **Hardened Concrete and Durability:** Compressive strength and parameters affecting it, Gain of strength with age, Maturity Concept, Elasticity, Creep and shrinkage, Permeability of Concrete, Durability of Concrete, relation between durability and permeability, corrosion of steel rebars.

UNIT IV **Concrete Mix Design:** Principles of concrete mix design, Concrete mix design steps as per Indian, American & British methods, destructive and non-destructive tests on concrete.

UNIT V **Special Concrete & Concreting Methods**: Need of special concrete, properties, ingredients, method of development and applications of Light weight concrete, Fibre reinforced concrete, Polymer Concrete, self-compacted concrete, High performance concrete, Ready mix concrete, Extreme weather concreting, special concreting methods, Vacuum dewatering - underwater concrete, special from work.

Text Books:

1. Concrete Technology – M.L. Gambhir (Tata McGraw Hill)
2. Concrete Technology Theory and Practice - M. S. Shetty, (S.Chand and Company Ltd. Delhi)

Reference Books:

1. Concrete Technology – A. M. Neville, J. J. Brooks, (Pearson Education)
2. Light Weight Concrete Academic Kiado – Rudhani G. (Publishing Home of Hungarian Academy of Sciences)
3. Concrete Technology – R.S. Varshney (Oxford, IBH Publishers)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Construction Planning**	Code:	**320655(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective:
1. To develop fundamental knowledge of project management and cost control.
2. To learn about various techniques for project planning, scheduling and monitoring.
3. To develop awareness of safety and quality control.

Outcome of the Subject:
1. To understand objective of construction planning.
2. Ability to develop construction schedule.
3. To understand the application of safety and quality control in construction.

UNIT I **Introduction:** Objectives and functions of construction management, stages in construction, stages of planning, bar charts and milestone charts, project feasibility reports, scheduling job layout and line of balance technique, applications.

UNIT II **Construction Scheduling:** PERT: Necessity for good scheduling, Elements of Network, Development of Network, PERT: Time estimates, Time computation, Network Analysis – slack, critical path

UNIT III **Construction Scheduling:** CPM - Steps in CPM Project Planning, Network Analysis, Activity times and floats, Critical activities and Critical Path Determination

UNIT IV **Cost Control & Resource Allocation:** Cost control in construction-importance, objectives of cost control, cost control systems. Economic analysis of engineering projects, economic studies, Resources allocation, Resources leveling, Project updating, Construction cost monitoring

UNIT V **Construction Safety and Quality Control:** Importance, Causes of Accidents, Safety measures, Responsibility for safety, Safety benefits to various parties, Safety clauses in contract, Safety policy, Safety hazards.
Quality control in construction: Importance, Elements of Quality, Quality Assurance Techniques, Quality Control Circles.

Text Books:

1. Project Planning and Control with PERT and CPM – B. C. Punmia, and K. K. Khandelwal (Laxmi Publications)
2. Construction Planning and Management – P. S.Gahlot and B. M. Dhir (New Age International)

Reference Books:

1. Construction Planning, Equipment and Methods – R. Peurify, C. J. Schexnayder, A. Shapira, R. Schmitt (Tata McGraw Hill)
2. PERT and CPM: Principles and Applications – L. S. Sreenath (Affiliated East West Press)
3. Construction Management and Accounts – V. N. Vazirani and S. P. Chandola (Khanna Publishers)
4. Construction Planning and Scheduling – J. W. Hinze (Pearson Education)
5. Contruction Project Planning and Scheduling – W. C. Patrick (Pearson Education)
6. Construction Management and Planning – B. Sengupta and H. Guha (Tata McGraw Hill)
7. Construction Engineering and Management – S. Seetharaman (Umesh Publications)
8. Construction Project Management – Planning, Scheduling and Controlling – K. K. Chitkara (Tata McGraw Hill)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Structural Engineering Laboratory**	Code:	**320661 (20)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

Experiments to be performed:

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:

1. Latest Release of Software Package STAAD Pro (Research Engineers International, Kolkata)
2. 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

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Geotech Engineering – II Laboratory**	Code:	**320662 (20)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

Experiments to be performed

1. Determination of water content dry density relation using light-compaction test.
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. Determination of Unconfined Compression Strength of cohesive soils (Remoulded / Unremoulded)
8. Laboratory Vane Shear Test (Remoulded / Unremoulded)
9. Consolidated test (Remoulded / Unremoulded) Consolidated test (Fixed Ring / Floating Ring).
10. To determine swelling pressure of purely cohesive soil (Remoulded / Unremoulded specimen)
11. Determination of density index (relative density) of cohensionless soils.
12. Study of standard penetration.
13. Determination of bearing capacity of soil by plate load.

List of Equipments / Machine Required:

1. Light Compaction Mould
2. Heavy Compaction Mould
3. Oven
4. CBR Apparatus
5. North Dakota Cone Apparatus
6. Direct Shear Test Apparatus with full accessories
7. Triaxial Compression Test Apparatus with full accessories
8. Consolidometer Apparatus
9. Unconfined Compression Test Apparatus
10. Swell Pressure Test Apparatus
11. Standard Penetration Test Apparatus with full accessories
12. Plate Load Test Apparatus with full accessories
13. Soil Sampling Tube

Recommended Books:

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

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Environmental Engineering – I Laboratory**	Code:	**320663 (20)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

Experiments to be performed

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 Cl_2 Content.
9. Determination of quantity of Optimum Coagulant Dose.
10. Determination of Break Point Chlorination.
11. Determination of Total Solids.
12. Determination of Turbidity.
13. Determination of particulates in air.
14. Determination of MPN.
15. Determination of pH of water.

List of Equipments / Machine Required:

1. BOD Incubator
2. Dust Sampler
3. Turbidity meter
4. Microscope
5. pH meter
6. Muffle Furnace
7. Hot Air Oven
8. Jar Test Apparatus

Name of Text Books:

1. Environmental Engineering Lab Manual – Dr. B. Kottaiah & N. Kumaraswamy (Charotar Publications)
2. Water Supply Engineering – S.K. Garg (Khanna Publication).
3. Water Supply Engineering – B.C. Punmia (Laxmi Publication, New Delhi)
4. Environmental Science and Engineering – Henry and Heinke (Pearson Education).

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Concrete Technology Laboratory**	Code:	**320664 (20)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

Experiments to be performed:

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
14. Determination of Compressive strength of concrete by non destructive test – Rebound Hammer

List of Equipments / Machine Required:

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

Recommended Books:

1. Lab Manual Concrete – M.L. Gambhir (Tata McGraw Hill)
2. Concrete Technology – M.S. Shetty (S. Chand & Co.)
3. Concrete Technology – M.L. Gambhir (Tata McGraw Hill)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Engineering**		
Branch:	**Common to All Branches**	Semester:	**VI**
Subject:	**Managerial Skills**	Code:	**300665 (76)**
No. of Lectures:	**2/Week**	Tutorial Period:	**NIL**
Total Marks in ESE:	**NIL**	Marks in TA:	**40**
Minimum number of Class Tests to be conducted:	**Two**		

Objective:
The course is introduced to develop managerial skills tremendously and enrich the abilities to enable one to meet the challenges associated with different job levels. Managerial skills are essential for overall professional development of an individual apart from gaining technical knowledge in the subject.

Course Objectives
Upon completion of this course, the student shall be able

- To define and explain the concept of managerial, written and oral communication skill;
- To understand the leadership skill;
- To develop self-appraisal and understand distinction between leader and manager;
- To develop positive attitude and thinking; and
- To understand managerial functions and develop creativity.

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 Brain storming, 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:** Concept of attitude through example, benefits of right 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? How to build up self confidence?

UNIT V **Creativity**: Creativity as a managerial skill, Trying to get a grip on creativity. Overview of Management Concepts: Function of Management: Planning, organizing, staffing, controlling.

Course Outcome

- The students will be able to develop formal and informal, negotiation, written and oral communication skill;
- The students will be able to develop manage groups, resolve conflicts and leadership skill and decision making qualities;
- The students will be able to develop self-appraisal, teaching, training and managing stress and time;
- The students will be able develop positive thinking, motivating team members and winning race; and
- The students will be able to develop creativity and fundamental management functions.

Text Books:

1. Basic Managerial Skills for all by E.H. Mc Grawth, Prentice Hall India Pvt Ltd,2006
2. Basic Employability Skills by P. B. Deshmukh, BSP Books Pvt. Ltd., Hyderabad, 2014

Reference Books:

1. How to develop a pleasing personality by Atul John Rego, Better yourself bools, Mumbai,2006
2. The powerful Personality by Dr. Ujjawal Patni & Dr. Pratap Deshmukh, Fusion Books, 2006
3. How to Success by Brian Adams, Better Yourself books, Mumbai, 1969

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Modern Construction Materials (Professional Elective-I)**	Code:	**320671(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective: To learn about various properties of modern construction materials.

Outcome: To know the importance and areas of application of modern construction materials.

UNIT I **Concretes:** High strength and High performance concrete-Fiber Reinforced concrete.

UNIT II **Metals:** New Alloy steels-Aluminium and its products-Other alloys.

UNIT III **Composites:** Plastics-Reinforced polymers-FRP-Celular cores.

UNIT IV **Other Materials:** Water proofing compounds-Non -weathering Materials-Flooring and Facade Materials.

UNIT V **Smart and Intelligent Materials:** Brief outline and uses.

Text Books:

1. Civil Engineering Materials (2nd Edititon) – Shan Somayaji (Prentice Hall Inc., 2001)
2. Materials for Civil and Construction Engineers – Mamlouk, M.S. and Zaniewski, J.P. (Prentice Hall Inc., 1999)

Reference Books:

1. Materials for Civil and Highway Engineers (4th Edition) – Derucher, K.Korfiatis. G. and Ezeldin, S. (Prentice Hall Inc., 1999)
2. High Performance Concrete – Aitkens (McGraw Hill, 1999)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Composite Materials (Professional Elective-I)**	Code:	**320672(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective: To learn about various properties of Composite Materials.

Outcome: To know the importance and areas of application of Composite Materials.

UNIT I Introduction, Historical background, Technological Applications, Composites – various reinforcement and matrix materials, Classification of composites.

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

UNIT III Fibre reinforced composite materials, Manufacturing Technique, Cost and Weight advantages.

UNIT IV 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 V Laminates-Laminated Plates, Analysis, Strength and design with composites, Fibre reinforced Pressure vessels.

text Books:

1. Mechanics of Composite Materials – Robert M.Jones (Taylor & Francis, Philadelphia, 1998)
2. Fibre Reinforced Composites – P.K. Mallick (Marcel Dekker, Inc., New York, 1993)

Reference Books:

1. Introduction to Design and Analysis with Advanced Composite Materials – Stephen R. Swanson (Prentice Hall, New Jersey, 1997)
2. Stress Analysis of Fiber-Reinforced Composite Materials – M.W. Hyer (WCB McGraw Hill, New York, 1998)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Advanced Strength of Materials (Professional Elective-I)**	Code:	**320673(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective: To learn about stresses and strains in detail and their impact on the behaviour of structures.

Outcome: To know about stresses and strains due to bending and torsion.

UNIT I Stresses and Strains in three dimensions, Theories of failure.

UNIT II Beams on elastic foundations, infinite, semi-infinite and finite beams.

UNIT III Bending of curved beams in the plane of loading-crane hooks and chain links. Bending of curved beam out of its initial plane, Saint Venant's equations and equations of equilibrium.

UNIT IV Bending of circular beams subjected to symmetric loading. 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.

UNIT V 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.

Text Books:

1. Advanced Strength of Materials – R. Solecki, R. J. Conant (Oxford University Press)

Reference Books:

1. Boresi, A.P. and Sidebottom, O.M., "Advanced Mechanics of Materials", John Willey and Sons.

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Modern Surveying Techniques (Professional Elective-I)**	Code:	**320674(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective: To learn in depth about modern surveying techniques.

Outcome: To know the importance and areas of application of modern surveying instruments.

UNIT I **Modern Surveying Equipment:** E.D.M. Instruments – Geodimeter, Tellurometer, Distomat, Total Station, Applications of Lasers in distance and angular measurements, Introduction of Electronic navigation and Position Fixing – different systems and their Characteristics.

UNIT II **Global Positioning System:** Global Positioning System – working principle and methods, Different Approaches to use GPS and their accuracies, Advantages of GPS in Navigation, Survey, Planning and Mapping.

UNIT III **Geographic Information System:** Geographic Information System – data requirement and database creation; Use of field data, maps, aerial and satellite data; Advantages of GIS.

UNIT IV **GIS Analysis:** Types of GIS analysis, map topology, map feature elements, queries, features in a topographic base map, base map accuracy standards.

UNIT V **Surveying Mapping through Software:** Introduction of ARC Info, ARC View, ARC Gms, Intergraph, MGE, Modular GIS Environment, Map Info and Geomedia web map, etc.

Text Books:

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

Reference Books:

1. Solving Problems in Surveying – Bannister, A. and Baker, R. (Longman Scientific Technical, U.K.)
2. Electronic Distance Measurement – Burnside, C.D. (Oxford, BSP Professional Books, London)
3. Engineering Surveying Technology – Kennie, T.J.M. and Petrie, G. (Blackie & Sons Ltd., London)
4. Electronic Surveying in Practice – Laurilla, S.H. (John Wiley & Sons, New York)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Remote Sensing and its Applications (Professional Elective-I)**	Code:	**320675(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective: To learn in depth about Remote Sensing and its Applications in Civil Engineering.

Outcome: To know the importance and areas of application of Remote Sensing.

UNIT I **Remote Sensing:** Introduction and definition of Remote Sensing terminology, Photogrammetry, Types of Photographs, Geometry of Photographs, Stereophotogrammetry.

UNIT II **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 III **Initial Statistics Extraction:**
Digital Satellite data products and their characteristics, Histogram and its utility, Enhancement, Different methods of digital satellite data interpretation.

UNIT IV **Radiometric and Geometric Correction in Image Processing:** Introduction, radiometric correction of remotely sensed data, correction for sensor system, detector error, spatial intercolation using coordinate transformations, intensity interpolation.

UNIT V **Micro Wave Remote Sensing:**Introduction, the radar principle, radar removal advantages, synthetic aperture radar (SAR), interpreting SAR images.

Text Books:

1. Campbell, J.B., "Introduction to Remote Sensing", The Guilford Press, Lond, 1986.
2. Wolf, P.R., "Elements of Photogrammetry", McGraw Hill Book Company, New Delhi, 1986.

Reference Books:

1. Curran, P.J., "Principles of Remote Sensing", Longman, London, 1985.
2. Engman, E.T. an Gurney, R.J., "Remote Sensing in Hydrology", (Chapman and Hall, London, 1991.

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**GIS and its Applications (Professional Elective-I)**	Code:	**320676(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective: To learn in depth about GIS and its Applications in Civil Engineering.

Outcome: To know the importance and areas of application of GIS.

UNIT I **Basic Concept of GIS:** Introduction, Information systems, spatial and non-spatial information, Geographical concepts and terminology, Advantages of GIS, Basic components of GIS, Organisation of data in GIS, Hardware & Software.

UNIT II **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 III **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 IV **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 V **Case Study:** A case study in GIS implementation, the consultant, the client, the initial applications, types of GIS analysis used for case study.

Text Books:

1. Introduction to Remote Sensing – Campbell, J.B. (The Guilford Press, London, 1986)
2. Remote Sensing and Geographic Information Systems – Legg, C.A. (Ellis Horwood, London, 1992)

Reference Books:

1. Principles of Geographic Information System for Land Resources Assessment – Burrough, P.A. (Monograph on Soil Resources Survey No. 12, Claredon, Press, Oxford, 1988)
2. Remote Sensing in Hydrology – Engaman, E.T. and Gurney, R.J. (Chapman and Hall, London, 1991)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Computational Hydraulics (Professional Elective-I)**	Code:	**320677(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective: To learn in depth about importance and use of Computational Hydraulics.

Outcome: To know the importance and areas of application of Computational Hydraulics.

UNIT I Introduction, significance of computational hydraulics, discrete forms of the laws of construction of mass, momentum and energy, examples of free surface flows.

UNIT II Continuous forms of the conservation laws, lateral inflow's 1-D expansions and contractions, homogeneous and stratified fluid flows.

UNIT III Method of characteristics – Characteristics and invarients, regions of state, computation of hydraulic jump, indeterminary conditions, the linearised method of characteristics.

UNIT IV Difference forms of conservation laws, weak solutions applications, storm-sewer networks, diffusion problems, river morphotogy, linear wave propagation.

UNIT V Numerical methods – Finite difference method with example 1-D horizontal flow.

Text Books:

1. Computational Hydraulics – Brebbia, C.A. and Ferrante, A.J. (Butterworth & Company Publishers)
2. Applied Hydraulic Transients (2nd Edition) – Chaudhary, M.H. (Van Nostrand Reinhold Company Inc.)

reference Books:

1. Unsteady Flow in Open Channels (Vol. - I & II) – Mahmood, K. and Yeyjevieh, V. (Water Resources Publications, Fort Collins, Colorado, U.S.A.)
2. Computational Hydraulics – M.B. Abbott (Pitman Publication Company)
3. Engineering Applications of Computational Hydraulics – M.B. Abbott & J.A. Gunge (Pitman Books Ltd.)
4. Computational Hydraulics: An Introduction –Vreugdenhill, C.B.(Springer-Verlag, Berlin)
5. Computational Hydraulics – Abbot, M.B. & A.W. Minns (Ashgate Publication)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Instrumentation in Fluid Mechanics (Professional Elective-I)**	Code:	**320678(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective: To learn in depth Instrumentation in Fluid Mechanics.

Outcome: To know the importance and areas of application of Instrumentation in Fluid Mechanics.

UNIT I

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 II **Pressure Measurements**

Manometers, capacitance and inductance transducers, non-contact probes.

UNIT III **Velocity measurements**

Pitot tube, Pitosphere and Pitocylinder, current meter, Hot wire anemometer, Laser-Doppler anemometer.

UNIT IV **Discharge Measurement**

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

UNIT V **Other Measurements**

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

Text Books:

1. Instrumentation: Devices and Systems – Rangan C.S., Sharma G.R. and Mani V.S.S. (Tata McGraw Hill Publishing Company)

Reference Books:

1. . Instrumentation for Engineers and Scientists – J. D. Turner, M. Hill (Oxford University Press)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Water Power Engineering (Professional Elective-I)**	Code:	**320679(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective: To learn about power generation from conventional sources of energy.

Outcome: To know about the importance and areas of Application of water power.

UNIT I **Introduction**

Development of water power, hydroelectric power, power potential, important hydropower plant in India, comparison of hydro, thermal & nuclear powers, future of hydro power, relation of water power and hydrology.

UNIT II **Water Power Estimate**

Estimate of stream flow for water power studies, flood formulae, rational method, unit hydrograph method, analysis of stream flow data, mass curve and determination of reservoir capacity, pondage, and estimation of available water power.

UNIT III **Types of hydropower plant**

Classification of hydro power plants, run-off river plant, storage plants, diversion canal plants, pumped storage plants, hydro electric power from sea and oceans.

UNIT IV **Water conveyance**

Pen stocks, classification of pen stocks, design criteria for pen stocks, economical diameter of pen stock, water hammer, surg tank, intakes, canals.

UNIT V **Power House Planning**

General layout of power house and arrangement of hydro power units, general arrangement of hydro electric unit, sub structure, super structure, abbreviated power houses, underground power house.

Text Books:

1. Water Power Engineering – M.M. Dandekar, K.N. Sharma (Vikas Publishing House Pvt. Ltd.)
2. Water Power Engineering – Deshmukh (Dhanpat Rai & Sons)

Reference Books:

1. Irrigation and Water Power Engineering – B.C. Punmia (Laxmi Publication)
2. Hydro Electric Engineering – Creager and Justin (Willay Institutional)
3. Hydro Electric Engineering Practice – Brown, J.G. (Blackie and Sons Ltd., London)
4. Irrigation and Water Power Engineering – Dr. P.N. Modi (Standard Book House)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Civil Engineering**	Semester:	**VI**
Subject:	**Earthquake Engineering (Professional Elective-I)**	Code:	**320680(20)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
No. of class Tests to be conducted:	**2 (Minimum)**	No. of assignments to be submitted:	**2 (Minimum)**
ESE Duration:	**Three Hours**	Maximum Marks in ESE: **80**	Minimum Marks in ESE: **28**

Objective: To learn about the causes of earthquakes and its effect on structures.

Outcome: To know about the ways of analyzing for earthquake forces and ways of minimizing the damages because of earthquake.

UNIT I Definitions of basic problems in dynamics, static versus dynamic loads, different types of dynamic loads, undamped vibration of SDoF system, natural frequency and period of vibration, damping in structure.

UNIT II Seismological background, seismicity of a region, earthquake faults and waves, structure of earth, plate tectonics, elastic – rebound theory of earthquake, Richter scale, measurement of ground motion, Seismogram.

UNIT III Direct determination of frequencies and mode shape, orthogonality principle, approximate methods for determination of frequencies and mode shape model error of forced vibration of MDoF.

UNIT IV Characterization of ground motion, earthquake response spectra, factors influencing response spectra, design response spectra for elastic system, peak ground acceleration, response spectrum shapes.

UNIT V Review of damage during past earthquakes and remedial measures, seismic design consideration, ductility demand, reinforcement detailing for member and joints.

Text Books:

1. Earthquake Resistant Design of Structures – P. Agrawal & M. Srikhande (Prentice Hall)
2. Earthquake Resistant Design of Structures – S. K. Duggal (Oxford University Press)

Reference Books:

1. Dynamics of Structures Theory & Applications to Earthquake Engineering – A. K. Chopra (Pearson Education)
2. Structural Dynamics – Theory & Computation – Mario Paz (CBS Publishers)
3. Basics of Structural Dynamics and Asesismic Design – S. R. Damodarasamy, S. Kavitha (PHI Learning)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING & EXAMINATION

B.E. (Civil) – 7th SEMESTER

S. No.	Board of Study	Subject Code	Subject	Periods per Week			Scheme of Examination			Total Marks	Credit
				L	T	P	Theory/ Pract.				
							ESE	CT	TA		L+(T+P)/ 2
1	Civil Engg.	320731(20)	Structural Engineering Design - III	4	1	-	80	20	20	120	5
2	Civil Engg.	320732(20)	Water Resources Engineering - I	4	1	-	80	20	20	120	5
3	Civil Engg.	320733(20)	Environmental Engineering - II	4	1	-	80	20	20	120	5
4	Civil Engg.	320734(20)	Quantity Surveying and Cost Evaluation	3	1	-	80	20	20	120	4
5	Refer	Table-2	Professional Elective- II	3	1	-	80	20	20	120	4
6	Civil Engg.	320761(20)	Structural Engineering Drawing - I Lab	-	-	3	40	-	20	60	2
7	Civil Engg.	320762(20)	Environmental Engineering - II Lab	-	-	3	40	-	20	60	2
8	Civil Engg.	320763(20)	Quantity Surveying and Cost Evaluation Lab	-	-	3	40	-	20	60	2
9	Civil Engg.	320764(20)	Minor Project	-	-	5	100	-	40	140	3
10	Management	320765(76)	Innovative and Entrepreneurial Skills	-	-	2	-	-	40	40	1
11	Civil Engg.	320766(20)	**Practical Training Evaluation and Library	-	-	1	-	-	40	40	1
			Total	**18**	**5**	**17**	**620**	**100**	**280**	**1000**	**34**

L- Lecture; T- Tutorial; P- Practical; ESE- End Semester Exam; CT- Class Test; TA- Teacher's Assessment

**** To be completed after VI Sem. and before the commencement of VII Sem.**

Table-2: Professional Elective-II

S. No.	Board of Study	Subject Code	Subject
1	Civil Engg.	320741(20)	Quality Control and Assurance in Construction
2	Civil Engg.	320742(20)	Safety in Construction
3	Civil Engg.	320743(20)	Fabrication and Erection of Structures
4	Civil Engg.	320744(20)	Construction Equipments and Techniques
5	Civil Engg.	320745(20)	Expansive Soils
6	Civil Engg.	320746(20)	Geotechnical Processes
7	Civil Engg.	320747(20)	Foundation Engineering
8	Civil Engg.	320748(20)	Transportation Planning and Management
9	Civil Engg.	320749(20)	Advanced Transportation Engineering
10	Civil Engg.	320750(20)	Traffic Engineering

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.

(2) Choice of elective course once made for an examination cannot be changed in future examinations.

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 7th

Subject: Structural Engineering Design-III

ESE Duration: 4 Hours

Subject Code: 320731(20)

Total Theory Periods: 50

Total Tutorial Periods: 12

Class Tests: 2

Assignments: 2

Maximum Marks: 80

Minimum Marks: 28

Note:

1. All designs should be as per latest version of code (IS:800-2007)
2. IS: 800-2007 and Steel Tables are permitted in Examination.
3. **Theory Paper of Four Hours Duration.**

Objectives of the Subject:

1. Understand the behavior of plate girders.
2. Understand the behavior of members subjected to combined forces.
3. Understand the behavior of column bases and gantry girders.
4. Understand the behavior of eccentric and moment connections.
5. Understand the behavior of roof trusses under different loads.

Outcomes of the Subject:

1. Capable of designing Plate Girders.
2. Capable of designing members subjected to combined forces.
3. Capable of designing Column bases & Gantry Girders.
4. Capable of designing eccentric and Moment connections.
5. Capable of designing Roof trusses.

Unit-1: Plate Girders with solid webs

Components of a Plate Girder, Typical sections, Proportioning of the section, Design bending strength, Design shear strength, Stiffened Web panels, minimum web thickness, bearing stiffeners, load carrying stiffeners, intermediate stiffeners, stiffener design, Design of beams and plate girders with solid webs.

Unit-2: Members subjected to combined forces

Combined shear & bending, combined axial force & bending moment, section strength, over all member strength, Design of members subjected to combined forces.

Unit-3: Column Bases and Gantry Girders

Types of column bases, slab base, gusset base, moment resisting base plates. Loads and load combinations, Typical sections, Design of gantry girders.

Unit-4: Eccentric and Moment Connections

Analysis of Bolt / Weld Group, Connection Configurations, Beam to Column connections, Beam to Beam connections, web splice and its connections, column splice and its connections.

Unit-5: Roof Trusses

Types of roof trusses, Loads - Dead , Imposed and wind loads, load combinations, Design of Purlins, Analysis & Design of roof trusses (with angle sections).

Text Books:

1. Design of Steel Structures - N. Subramanian (Oxford University Press)
2. Limit State Design of Steel Structures – S. K. Duggal (Tata McGraw Hill)

Reference Books:

1. Indian Standard – General Construction in Steel –Code of Practice (3rd Revision) (IS:800 – 2007)
2. Design of Steel Structures – K. S. Sai Ram (Pearson Education)
3. Structural Steel Design : LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education)
4. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning)
5. Limit State Design of Steel Structures (IS:800-2007) – V. L. Shah, V. Gore (Structures Publications)
6. Design Manual for Designing Steel Structures according to New IS:800, Publication Number INS/PUB/114 – Institute for Steel Development and Growth, Kolkata
7. Teaching Resource for Structural Steel Design, Vol. I – III, Publication Number INS/PUB/051, Institute for Steel Development and Growth, Kolkata

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 7th

Subject: Water Resources Engineering-I

ESE Duration: 3 Hours

Subject Code: **320732(20)**

Total Theory Periods: 50

Total Tutorial Periods: 12

Class Tests: 2

Assignments: 2

Maximum Marks: 80

Minimum Marks: 28

Objectives of the Subject:

1. To understand basic concepts of irrigation and water requirements of crops.
2. To understand the concepts of design of canal.
3. To learn about water logging
4. Be familiar with the concepts of river training.
5. To understand the concepts of reservoir planning.

Outcomes of the Subject:

1. Students are able to understand the different types of irrigation.
2. Students should be able to design the canal.
3. Students can explain the effects of water logging.
4. Students should be able to understand the behavior of river.
5. Students can plan the reservoir for different demands.

Unit-1: Methods of Irrigation and Water Requirements of crops

Need for Irrigation, Advantages and Disadvantages of irrigation, development of irrigation in India. Types of Irrigation systems – Flow Irrigation, Tank Irrigation, Lift Irrigation, Tube Well Irrigation. Soil-Water-Crop relationship, Soil groups in India. Methods of Irrigation: Introduction, requirement of irrigation methods, surface and sub surface irrigation, sprinkler and drip irrigation. Water Requirement of Crops: Introduction, Water requirement of crop, quantity of water for irrigation, consumptive use of water or evapo-transpiration, crop season and crops of India, crop period and base period, delta, duty of water, relationship between delta duty and base period, factors affecting duty, methods of improving duty, Intensity of irrigation, irrigation requirement of crops.

Unit-2: Canal Irrigation

Classification of canal, parts of canal irrigation system, canal alignment, lay-out of canal system, typical canal cross section, command areas, losses in irrigation systems, and water requirement of irrigation channels. Design of Stable Channels in Alluvium: Introduction, Kennedy's silt theory, Garret's diagram, Lacey's Theory, Lacey's regime equations, Lacey's shock theory, Design of channels by Kennedy's and Lacey's theories, Use of Lacey's diagrams, maintenance of Irrigation channels, sediment transport, silting of canals and its control.

Unit-3: Water Logging and its Control

Causes and ill effects of water logging, prevention and control, reclamation of water logged and saline lands, surface drainage. Design of Lined Channels: Introduction, benefits of lining, types of lining, economics of lining, procedure and design of lined canals. Distribution of canal waters:System of regulation and control, requirement of a good outlet, types of outlet.

Unit-4: River behaviour, Control and Training

Objects, river characteristics, river patterns, classification of river training works, methods of river training embankments, bank protection, spurs, cutoffs, pitched island, river diversion, meandering causes and parameters. Flood Control: Introduction, Flood estimation, levees and embankments, channel improvement, flood ways evacuation and flood plain zoning, economics of flood control, National Policy of floods, flood forecasting.

Unit-5: Reservoir Planning

Introduction, Type of reservoirs, storage zones of a reservoir, mass curve and demand curve, determination of reservoir capacity, safe field. Flood Routing:Graphical method, trial and error method, reservoir losses, reservoir sedimentation, life of reservoir, environmental effects of reservoirs.

Text Books:

1. Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications)
2. Irrigation Engineering – B.C. Punmia (Laxmi Publications)

Reference Books:

1. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)
2. Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand & Bros.)
3. Irrigation Engineering – Asawa G.L. (New Age International Publications)
4. Fundamentals of Irrigation Engineering – Bharat Singh (Nem Chand & Bros.)

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering
Branch: Civil Engineering
Semester: 7th
Subject: Environmental Engineering-II
ESE Duration: 3 Hours
Subject Code:320733(20)
Total Theory Periods: 50
Total Tutorial Periods: 12
Class Tests: 2
Assignments: 2
Maximum Marks: 80
Minimum Marks: 28

Objectives of the Subject:

1. To give an overview of importance of proper sewage disposal and various sewerage systems.
2. To introduce the students the estimation of domestic sewage and other sewer appurtenances.
3. To impart a detailed knowledge in the design of various sewage treatment processes.
4. To impart knowledge about the different industrial waste treatment technique.
5. To provide knowledge about the environmental social and health implications of solid waste and its management.

Outcomes of the Subject:

1. A student must be capable of designing a sewer system for a city taking into consideration the variations in flow.
2. The student should be capable of managing controlling the sewage treatment plant with complete knowledge of the design values and this functioning.
3. The student must be able to decide upon the quantum of treatment to be given to the wastewater from different sources before they are discharged to open water courses.
4. The student must be able to analyze coming from various processes in an industry and decide upon the techniques of treatment to be given.
5. The student will be socially responsible and aware of the social, environmental and health implications of solid waste and its management.

Unit-1: Estimation of Sewage

Sewage and Sewerage, definitions and some common terms, object of sewage disposal. System of sanitation: Conservancy systems, Water system, sewage system-combined, separate and partially separate, patterns of collection system.

Amount of sewage: Estimation of domestic and storm sewage, variations in the quantity of sewage, Design of sewers (Only circular sewer) Manholes, Pumping stations, Wet well capacity.

Unit-2: Sewage Treatment

Characteristics of sewage: Physical, chemical and biological characteristics, fundamentals of aerobic & anaerobic process.

Sewage treatment: Preliminary treatment systems, Racks and screens, comminute Grit chambers.

Primary treatment systems: Plain sedimentation, detention time and over-flow rates, types of inlets and outlets, onsite wastewater treatment- septic tank, Imhoff tank, oxidation pond .

Unit-3: Secondary treatment systems

Attached growth process: Trickling filters, standard and high rates, efficiency (NRC) formula, and operational problems of trickling filters. Suspended growth process, principle of suspended growth process, Activated sludge process, Oxidation ditch aeration and mixing techniques, Operational problems of activated sludge systems, stablisation tools aerobic, anaerobic and facultative lagoon.

Unit-4: Sewage Sludge Treatment and Sewage Disposal

Importance, amount and characteristics of sludge, sludge digestion, Anaerobic digestion, aerobic digestion, sludge drying beds.

Disposal by dilution, self purification of polluted streams, factors affecting self purification, Sag curve, disposal on land surfaces. Stream standards, Effluent standards, theories of waste treatment (Volume reduction, strength reduction, new Equalization and proportioning) Summery of Industrial waste, its origin, character and treatment.

Unit-5: Solid Waste Management

Solid waste management, source and characteristics, environmental and health implications, refuse characteristics, collection methods, disposal of solid waste by land filling, composting and incineration methods. Collection and disposal of refuse, Composting of refuse.

Text Books:

1. Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
2. Waster Water Engineering – S.K. Garg (Khanna Publication).
3. Waste Water Engineering – B.C. Punmia (Laxmi Publication, New Delhi)

Reference Books:

1. Environmental Science and Engineering – Henry and Heinke (Pearson Education).
2. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).
3. Introduction to Environmental Science – Y Anjaneyulu (B S Publications).
4. Environmental Science and Engineering – henry and heinke (Pearson Education).
5. Waste Water Engineering – Metcalt Eddy (Tata McGraw Hill, New Delhi)

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 7th

Subject: Quantity Survey and Cost Evaluation

ESE Duration: 3 Hours

Subject Code: 320734(20)

Total Theory Periods: 40

Total Tutorial Periods: 12

Class Tests: 2

Assignments: 2

Maximum Marks: 80

Minimum Marks: 28

Objectives of the Subject:

1. To provide an understanding of estimate, their types, items and units of work, and types of approximate estimate.
2. To provide an understanding of determining quantity estimate of civil engineering works.
3. To provide an understanding of rate analysis and its application to different items.
4. To provide an understanding of general requirements of contracts.
5. To provide an understanding of the concept of valuation of properties.

Outcomes of the Subject:

1. Students are expected to identify various items of building and able to determine approximate estimate of buildings.
2. Students are expected to determine quantities estimate of civil engineering works from given details.
3. Students are expected to know about determination of quantities of materials and rate analysis of any items in residential building works.
4. Students are expected to know contract and its types.
5. Students are expected to know concept of valuation.

Unit-1: Introduction to Estimation

Introduction to quantity surveying, methods of measurements and units of measurements of various items of work, Principles of estimating, different types of estimates, procedure for computation of stage I estimate.

General Terms: Administrative approval, technical sanction, competent authority, Deposit works, suspense account, imprest account, indent of stores, muster roll. Measurement book, material at site account, stock account, establishment charges, contingencies.

Unit-2: Quantity Estimate

Methods, data required for estimation detailed estimates of residential building works of single and double storey, determining quantities of actual reinforcement in building components, bar bending schedule, making bill of quantities, determination of earth work in road and canals.

Unit-3: Analysis of rates

Purpose and principles factors affecting the rates of items of works, Analysis of rates of different items such as cement concrete of different proportions, brick masonry in different mortars, flooring (tiles, mosaic, cement concrete flooring), use of Schedule of rates.

Specifications: Purpose and basic principles, types of specifications: brief and detailed specifications for various items of works.

Unit-4: Contracts

General requirements of contract, types of contract, conditions, termination of contract, brief idea about types of tender, tender notice, earnest money, security deposit, liquidated damages, arbitration, and escalation.

Unit-5: Valuation of property

General, object of valuation, definitions of terms related to valuation, methods of determining value of property, development method and rental method of valuation, concept of capitalized value and year purchase, depreciation, lease, mortgage, easement.

Text Books:

1. Estimating and Costing in Civil Engineering – B.N. Dutta (UBS Publishers, New Delhi)
2. Estimating and Costing and specifications – M. Chakrabarty (UBS Publishers, New Delhi)

Reference Books:

1. Textbook of Estimating and Costing – G.S. Birdi (Dhanpat Rai Publications)
2. Valuation of real properties – S.C. Rangwala (Charotar Publication)
3. A Textbook of Estimating and Costing – Kohli & Kohli (S. Chand & Co.)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering	**Branch:** Civil Engineering
Semester: 7th	**Subject:** Professional Elective-II (Quality Control and Assurance in Construction)
ESE Duration: 3 Hours	**Subject Code: 320741(20)**
Total Theory Periods: 40	**Total Tutorial Periods:** 12
Class Tests: 2	**Assignments:** 2
Maximum Marks: 80	**Minimum Marks:** 28

Objectives of the Subject:

1. To learn about techniques for quality control and assurance in construction.

Outcomes of the Subject:

1. To be able to plan and handle issues related to quality control and assurance in construction.

Unit-1: Construction Projects

Agencies involved in Construction Projects, mutual relationship, quality control at site; and whose job is it.

Unit-2: ISO / IS Requirements

IS 9000 (Parts 1 to 4) (Pt 1; 1994, Pt 2; 1993, Pt 3; 1991, Pt 4; 1993) for Total Quality Management. ISO 14000 – 1988 for environment – Impact of large construction projects.

Unit-3: Quality Control on Construction Projects

Inspection of reinforced concrete, masonry and steel works, testing techniques and quality at reports.

Unit-4: Statistical Analysis

Sampling frequencies, statistical and reliability analysis, optimum sample size.

Unit-5: Quality Assurance

Quality Assurance in constructions.

Text Books:

1. ISO 9000 in Construction – Nee, Paul A. (Wiley Interscience Publication, 1994)
2. IS: 14000, Quality System – Guidelines for Selection and Use of Standards on Quality System 1988.

Reference Books:

1. ISO 9000 in Construction – Wah, L.S., Min., L.C. & Ann, T.W. (McGraw Hill Book Company, 1996)
2. Construction Engineering and Management – S. Seetaraman (Umesh Publication)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering
Branch: Civil Engineering
Semester: 7th
Subject: Professional Elective-II (Safety in Construction)
ESE Duration: 3 Hours
Subject Code: 320742(20)
Total Theory Periods: 40
Total Tutorial Periods: 12
Class Tests: 2
Assignments: 2
Maximum Marks: 80
Minimum Marks: 28

Objectives of the Subject:

1. To learn about techniques for ensuring safety in construction.

Outcomes of the Subject:

1. To be able to plan and handle issues related to safety in construction.

Unit-1: Construction Project

A brief outline project definition, elements, relation to safety, types of projects and safety hazards.

Unit-2: Construction sites and safety

Tools: Electrical, Pneumatic, Grinding, Hand tools.

Machinery: Earth moving, Concrete Breaker, Carpenters, Transporting, Batching Plant and Concrete Mixer, Dumpers.

Material Handling: Various materials and their effects, storing materials. Common Risks and Hazards.

Unit-3: Planning Safety for Construction Projects

Safety Construction Safety, Legal Requirements, First-Aid, Safety Clauses in contract, Safety Policy, Safety deposit, Safety Officer, Safety Committees, Safety of Contractors Worker.

Unit-4: Safety Practices

Roads and bridges, tunneling, buildings, and structures, (excavation, blasting, consent, machinery, transportation, concrete structures, piling, deep foundations, compressed air, tunneling, dewatering, structural steel erection, floors, and walk opening, demolition, use of ladders, electrical works, welding and cutting, grinding and chipping, hoisting apparatus, A.C. Roofs.

Unit-5: Modern project

Special Safety practices for Modernisation Project. Planning for sequential operations and emergencies first aid, fire hazards and preventive methods.

Text Books:

1. Construction Safety, Security and Loss Prevention – B. Fulman

Reference Books:

1. Fundamental of Construction Safety – P.T. Armstrong
2. Construction Engineering and Management – S. Seetaram (Umesh Publication)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering	**Branch:** Civil Engineering
Semester: 7th	**Subject:** Professional Elective-II (Fabrication and Erection of Structures)
ESE Duration: 3 Hours	**Subject Code: 320743(20)**
Total Theory Periods: 40	**Total Tutorial Periods:** 12
Class Tests: 2	**Assignments:** 2
Maximum Marks: 80	**Minimum Marks:** 28

Objectives of the Subject:

1. To learn about techniques for fabrication and erection of structures.

Outcomes of the Subject:

1. To be able to plan and handle issues related to fabrication and erection of structures.

Unit-1: General

Various slopes, size and properties of rolled steel sections, tubes and hollow rectangular sections: Chemical composition, physical properties and weldability of various types of structures steel, their suitability for various purposes.

Planning, Estimating and costing: Scope, components of costing for fabrication and erection, Economy and cost control, various processes for joining, forming, cutting and welding.

Fabrication Operations: Various operations like interpretation of drawings, shop-floor operations, fastenings, assembling, finishing and shipping, sub-assemblies and main assemblies, fabrication of pipes and peristocks.

Inspection of fabrication: Code provisions for tolerances and deviations, Inspection of welds, radiographic and ultrasonic techniques.

Unit-2: Fabrication Drawings

Structural connections, their classification, symbols for their representation, layout of an industrial building, preparation of fabrication drawing and detailing for columns, trusses, beams and cladding, detailing of truss-joints, column bases, beam to beam and column to beam connection (Seated and framed).

Note: At least three drawing sheets on above shall be prepared as class work. The examination paper shall contain questions on above to be illustrated with sketches.

Unit-3: Erection (Part-I)

Principle of erection, Erection organisation, Preparation and reading of erection drawing, Assembly marks, common types of structures to be erected, erection of tackle and false work equipments for lifting and rigging, Code provisions for erection.

Methods of erection, levelling and alignment, setting out and grouting, allowable tolerances for plumbing, levelling and alignment.

Tools and equipments for erection, various types of derricks, cranes and winches.

Unit-4: Erection (Part-II)

Miscellaneous small tools for erection like drifts, shakles and grips, erection of shed type buildings, portal frames, multi-storeyed buildings, prefabricated tanks, towers and chimneys.

Unit-5:

Inspection, Quality Control and Safety – Various stages of inspection, Quality control departments, prescribed tolerances and deviations, methods of rectification of defects, Accidents and their causes, Various unsafe acts and precautions for their prevention, Rules for safety for cranes, winches, etc. Safety during electrical operations and while using X-ray equipments, Maintenance of erected structures, surface treatment against corrosion, etc.

Text Books:

1. Structural Steel Fabrication and Erection – S.K. Saxena and R.B. Asthane (Somaiya Publications, 172, Mumbai Marathi Granth, Sangrahalaya Marg, Dadar, Bombay-14)

Reference Books:

1. Structural Steel Drafting and Detailing – Shivagunde and Asthana (Somdiya Publications)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering	**Branch:** Civil Engineering
Semester: 7th	**Subject:** Professional Elective-II (Construction Equipments and Techniques)
ESE Duration: 3 Hours	**Subject Code: 320744(20)**
Total Theory Periods: 40	**Total Tutorial Periods:** 12
Class Tests: 2	**Assignments:** 2
Maximum Marks: 80	**Minimum Marks:** 28

Objectives of the Subject:

1. To learn about various equipments for construction and the techniques for systematic construction using these equipments.

Outcomes of the Subject:

1. To be able to plan and handle construction equipments and techniques related to construction.

Unit-1: Construction Equipments

Fundamentals of earthwork operations - Earth moving operations -Types of Earthwork Equipment-Tractors, Motor Graders, Scrapers, Front end waders, Earth Movers.

Equipment for Dredging, Trenching, Tunnelling, Drilling, Blasting-Equipment for compaction-Erection Equipment.

Types of pumps used in construction - Equipment for Dewatering and Grouting -Foundation and Pile Driving Equipment.

Forklifts and Related Equipment - Portable Material Bins – Conveyors - Hauling Equipment.

Unit-2: Equipment for Production of Aggregate and Concreting

Crushers-Feeders-Screening Equipment-Handling Equipment-Batching and Mixing Equipment-Hauling, Pouring and Pumping Equipment-Transporters.

Unit-3: Sub-structure Construction Techniques

Box jacking -Pipe Jacking-Under Water Construction of diaphragm walls and basement -Tunnelling techniques piling techniques-driving well and caisson-sinking cofferdam-cable anchoring and grouting-driving diaphragm walls, sheet piles-laying operations for built up offshore system-shoring for deep cutting-Large reservoir, construction with membranes and Earth system-well points-Dewatering and stand by Plant equipment for underground open excavation

Unit-4: Super Structure Construction

Vacuum Dewatering of concrete flooring-Concrete paving technology-Techniques of construction for continuous concreting operation in Tall buildings of various shapes and Varying sections-Launching Techniques-Suspended from work-erection techniques of tall structures, Large span structures-Launching techniques for heavy decks in situ prestressing in high rise structures, aerial transporting handling erecting light weight components on tall structures-erection of latice tower as and rigging of transmission line structures.

Unit-5: Repair Construction

Mud jacking grout through slab foundation-micropiling for strengthening floor and shallow profile-pipeline laying protecting sheet piles, screw anchors-sub grade water proofing under pining advanced techniques and sequence in demolition and dismantling.

Text Books:

1. Construction Planning, Equipment and Methods (5th Edition) – Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C. (McGraw Hill, Singapore, 1995).
2. Construction Equipment and Management – Sharma S.C. (Khanna Publishers New Delhi, 1988).

Reference Books:

1. Construction Equipment and Job Planning – Deodhar, S.V. (Khanna Publishers, New Delhi, 1988).
2. Construction Equipment and its Planning and Application – Dr. Mahesh Varma (Metro-politan Book Company, New Delhi-, 1983).
3. Practical foundation engineering hand book – Robertwade Brown (McGraw Hill Publications, 1995).
4. Construction Dewatering: New Methods and Applications – Patrick Powers. J. (John Wiley and Sons, 1992).
5. Advanced Construction Techniques – Jerry Irvine (CA Rocketr, 1984)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering
Branch: Civil Engineering
Semester: 7th
Subject: Professional Elective-II (Expansive Soils)
ESE Duration: 3 Hours
Subject Code: 320745(20)
Total Theory Periods: 40
Total Tutorial Periods: 12
Class Tests: 2
Assignments: 2
Maximum Marks: 80
Minimum Marks: 28

Objectives of the Subject:

1. To learn about techniques related to construction in expansive soils.

Outcomes of the Subject:

1. To be able to plan and handle issues related to construction in expansive soils.

Unit-1: Introduction and Identification

Expansive Soils of India, related civil engineering problems, formation of expansive soils in field, identification of expansive solids in laboratory by X-ray diffraction method and differential thermal analysis.

Unit-2: Physical and Chemical Properties

Soil structure and clay minerology of expansive soil, atomic bond and molecular bonds, honey comb structure, base exchanges capacity, clay water relation, electrolysis processes.

Unit-3: Foundation on Black Cotton Soil

Foundations on swelling soils, swelling potential and mechanism of volume change, chemical composition of black cotton soil, construction techniques in black cotton soil, modern method of construction in under reamed coil.

Unit-4: Ground Improvement Techniques

Stabilization of expansive soils with lime, slag (silica fume and aluminium sludge), cement, fly ash, chemicals, reinforced earth technique, micro reinforced vegetation, vibro floatation, grouting and soil nailing.

Unit-5: Liquefaction Hazard Mitigation

Factors affecting the expansive soil, method of assessment for liquifaction, effect instrumentation for monitoring, consolidation of marine clay deposits, expansive soil model of Bingham fluid bounded by porous beds.

Text Books:

1. Design Aids in Soil Mechanics and Foundation Engineering – S.R. Kaniraj (Tata McGraw Hill, New Delhi).
2. Foundation Engineering – Dr. B.J. Kasmalkar (Pune Vidyarthi Griha Prakashan, Pune).

Reference Books:

1. Basic and applied Soil Mechanics (Revised Edition) – Gopal Rajan and Rao A.S.R. (New Age, New Delhi. 1998).
2. Foundation Engineering (2nd Edition) – Peck,R.B., Hanson (W.E. and Thornburn. W.H. Johan Wiley, New York 1976).
3. Foundation Analysis and Designing – J.E. Bowles (McGraw Hill).
4. Soil Engineering in Theory and Practice (Vol. - II) – Alam Singh (Asia Publishing House, New Delhi, 1981)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering
Branch: Civil Engineering
Semester: 7th
Subject: Professional Elective-II (Geotechnical Processes)
ESE Duration: 3 Hours
Subject Code: 320746(20)
Total Theory Periods: 40
Total Tutorial Periods: 12
Class Tests: 2
Assignments: 2
Maximum Marks: 80
Minimum Marks: 28

Objectives of the Subject:

1. To learn about various geotechnical processes used in construction.

Outcomes of the Subject:

1. To be able to plan and handle issues related to various geotechnical processes used in construction.

Unit-1: Dewatering

Methods, selection, analysis and design of dewatering system.

Unit-2: Grouting

Types of grouts and their properties; Methods of grouting; Grout selection and control.

Unit-3: Compaction

Diffused double layer theory of compaction; Methods of compaction; Engineering properties of compacted soil; Field compaction and its control.

Unit-4: Soil Stabilisation

Stabilisation using chemical additives and other methods.

Unit-5: Reinforced Earth

Concept, materials, application and design of reinforced earth wall.

Text Books:

1. Modern Geotechnical Engineering – Alam Singh (IBT Publishers, Delhi, 1987).
2. Analysis and Design of Substructures – Swami Saran (Oxford and IBH, New Delhi, 1996).

Reference Books:

1. Foundation Design and Construction (5th Edition) – Tomlinson, M.J. (ELBS, Singapore, 1988).
2. Foundation Engineering (Ed.) – Leonards, G.A. (McGraw Hill, New York, 1962).
3. Geotechnical Engineering – Lee, I.K., White, W. and Ingles, O.G. (Pitman, Marshfield, Mass (U.S.A.), 1983).

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 7th

Subject: Professional Elective-II (Foundation Engineering)

ESE Duration: 3 Hours

Subject Code: 320747(20)

Total Theory Periods: 40

Total Tutorial Periods: 12

Class Tests: 2

Assignments: 2

Maximum Marks: 80

Minimum Marks: 28

Objectives of the Subject:

1. To learn about techniques related with construction of different types of foundations.

Outcomes of the Subject:

1. To be able to plan and handle issues related with construction of different types of foundations.

Unit-1: Site Investigation and Selection of Foundation

Introduction, Scope and objectives, Method of exploration boring, Sampling, disturbed and undisturbed sampling, sampling techniques, Bore log and report, Penetration tests (SPT and SCPT), Data interpretation, Selection of foundation based on soil condition.

Unit-2: Shallow Foundation

Introduction, Location and depth of foundation, codal provisions, bearing capacity of shallow foundation on homogeneous deposits, bearing capacity from insitu tests, Factors influencing bearing capacity, codal provisions, Settlement, Components of settlement, Settlement of foundations on granular and clay deposits, Allowable and maximum differential settlements of buildings, Codal provision, Methods of minimising settlement.

Unit-3: Footings and Rafts

Types of foundation, structural design of spread footing, Design aspects of combined and mat foundation, Codal provisions.

Unit-4: Piles

Types of piles, Factors influencing the selection of pile, Carrying capacity in granular and cohesive soils, Static and dynamic formulae, Capacity from insitu tests (SPT and SCPT), Piles subjected to uplift, Negative skin friction, Group capacity, Settlement of pile groups, Interpretation of pile load test, Pile caps, Codal provisions.

Unit-5: Retaining Walls

Earth pressure theory, Plastic equilibrium in soils, active and passive states, Rankine's theory, Coloumb's wedge theory, Classical and limit equilibrium solution, Earth pressure on retaining walls of simple configurations, pressure on the wall due to single line load alone, Graphical method (Culmann's method alone), Stability of retaining wall.

Text Books:

1. Soil mechanics and foundations – Punmia, B.C. (Laxmi publications Pvt. Ltd., New Delhi, 1995).
2. Soil Mechanics and Foundation Engineering – Arora, K.R. (Standard publishers and distributors, New Delhi, 1997).

Reference Books:

1. A Textbook of Geotechnical Engineering – Khan, I.H., (Prentice Hall of India, New Delhi, 1999).
2. Basic and applied soil mechanics – Gopal Ranjan and Rao, A.S.R. (Wiley Eastern Ltd., New Delhi (India), 1997).
3. Foundation Analysis and Design – Bowles J.E. (McGraw Hill, 1994).

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering	**Branch:** Civil Engineering
Semester: 7th	**Subject:** Professional Elective-II (Transportation Planning and Management)
ESE Duration: 3 Hours	**Subject Code: 320748(20)**
Total Theory Periods: 40	**Total Tutorial Periods:** 12
Class Tests: 2	**Assignments:** 2
Maximum Marks: 80	**Minimum Marks:** 28

Objectives of the Subject:

1. To learn about techniques related to transportation planning and management.

Outcomes of the Subject:

1. To be able to plan and handle issues related with transport planning and management.

Unit-1: Introduction

Urbanization and transportation problems, transportation sector in five year plans, regional transportation plans, comprehensive transportation planning, goals and objectives, principles of transport planning, process of urban transport planning.

Unit-2: Trip Generation Analysis

Trip classification, multiple regression analysis, trip rate analysis, category analysis.

Unit-3: Trip Distribution Analysis

Methods of trip distribution, uniform factor method, average factor method, frator method, furness method, limitations of growth factor methods, elementary gravity model.

Unit-4: Model Choice Analysis

Determinants of mode choice, theoretical framework for discrete choice model, binomial and multinomial logit model, choice-set determination, model specification, functional form, statistical estimation, validation.

Assignment: Basic concepts, traffic assignment methods, all-or-nothing assignment, multiple route assignment, capacity restraint assignment, diversion curves.

Unit-5: Economic Evaluation of Transport Plans

Need, costs and benefits of transport projects, methods of economic evaluation, benefit-cost ratio method, first year rate of return, net present value methods, internal rate of return method.

Major Issues: Public transport policy, intermediate public transport, non motorized transport, transport facility for elderly population, women and children.

Text Books:

1. Traffic Engineering and Transport Planning – Kadiyali, L.R. (Khanna Publishers, Delhi, 1996).
2. Transport Planning and Traffic Engineering – Flaherty, CAO (John Wiley & Sons, Inc., New York, 1997).

Reference Books:

1. Principles of Urban Transport Systems Planning – Hutchinson, B.G. (Scripta Book Company, Washington, D.C., 1974).
2. Modelling Transport – Ortuzar, title D. and Willumson, L.G. (John Wiley & Sons, New York, 1995).

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering	**Branch:** Civil Engineering
Semester: 7th	**Subject:** Professional Elective-II (Advanced Transportation Engineering)
ESE Duration: 3 Hours	**Subject Code: 320749(20)**
Total Theory Periods: 40	**Total Tutorial Periods:** 12
Class Tests: 2	**Assignments:** 2
Maximum Marks: 80	**Minimum Marks:** 28

Objectives of the Subject:

1. To learn about techniques for economical design of rigid and flexible pavements.

Outcomes of the Subject:

1. To be able to plan and handle issues related to economical design of rigid and flexible pavements.

Unit-1: Highway Economics and Financing

Benefits from highway improvement, cost of highway transportation, highway method, benefit cost ratio method, methods of raising highway finances.

Unit-2: Highway Materials

Evaluation of subgrade soil, group index, plate bearing test, C.B.R. test Bituminous paving mixes – Requirements, Design of mixes, Marshall Method, Modified Hubbard-Field Method.

Highway Construction: Material, Equipment, Construction procedure and quality control in construction of water bound macadam roads, Bituminous roads and cement Concrete roads, Construction of joints in cement concrete pavements, Joint fillers and scalers.

Unit-3: Design of flexible pavements

Design wheel loads, climatic variations, Empirical and semi-empirical methods of design, Group Index, C.B.R. Triaxial, Mc Load Lumister's layered system, North Dakota cone method, design of airport pavements, various design factors, design of flexible airport pavements.

Unit-4: Design of rigid Pavements

Design considerations, wheel load stresses, temperature stresses, design of joints in cement concrete pavements, design of rigid airport pavements.

Unit-5: Soil Stabilized road

Basic Principles of soil stabilization, various methods of soil stabilization, proportioning of materials, Mehra's method of soil stabilization, design of soil cement, soil lime and soil bitumen mixes, stabilization of black cotton soil and desert sand pavement failure, evaluation and strengthening failure of flexible and rigid types of pavements, a Road nic and periodic maintenance, design of overlay with bankelmn beam, different types of overlays, airport pavement overlays.

Text Books:

1. Traffic Engineering and Transport Planning – Kadiyali, L.R. (Khanna Publishers, Delhi, 1996).
2. Transport Planning and Traffic Engineering – Flaherty, CAO (John Wiley & Sons, Inc., New York, 1997).

Reference Books:

1. Principles of Urban Transport Systems Planning – Hutchinson, B.G. (Scripta Book Company, Washington, D.C., 1974).
2. Modelling Transport – Ortuzar, title D. and Willumson, L.G. (John Wiley & Sons, New York, 1995).

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 7th

Subject: Professional Elective-II (Traffic Engineering)

ESE Duration: 3 Hours

Subject Code: 320750(20)

Total Theory Periods: 40

Total Tutorial Periods: 12

Class Tests: 2

Assignments: 2

Maximum Marks: 80

Minimum Marks: 28

Objectives of the Subject:

1. To develop the fundamental knowledge of Traffic Engineering.
2. To know the problems occurring due to mixed traffic in developing country.
3. To know the details of traffic flow.
4. Develop the use of sign, signal, and island.
5. To develop the knowledge about accidents and its reduction.
6. To develop the knowledge of different pollution occurring and its remedial measures.

Outcomes of the Subject:

1. This subject will provide the knowledge of traffic, its problem and remedial measures in mixed traffic in developing country.
2. It will provide the knowledge of traffic characteristic in details.
3. It will help in reducing the accidents.
4. It will help in geometric design of road, road lightening.
5. It will help in controlling the different pollution occurring in road.

Unit-1: Introduction

Traffic Engineering, Growth of Traffic, Function of Traffic Engineer, 3E's of traffic Engineering, Special problems due to mixed traffic and other conditions in developing countries, Measures to meet the Problem, Concept of PCU.

Unit-2: Traffic Characteristics

Road user characteristics, Vehicular characteristics, Traffic flow characteristics, Capacity, Traffic studies, Volume, Spot speed, Speed and delay, Origin and destination, Parking and accident, Design of Parking Facilities.

Unit-3: Traffic Operations

Traffic regulations, Controls on vehicles, Drivers and flow, One way street tidal flow operation, priority for high occupancy vehicles, Traffic control devices, Signs, Signals, Islands and markings, Design of isolated traffic signals by IRC method.

Unit-4: Traffic Safety

Accidents, Analysis of traffic accidents, Preventive Measures, Highway lighting, Effect of road conditions and road geometrics on traffic safety, Traffic safety awareness.

Unit-5: Traffic and Environment

Pollution problems of cities, Noise pollution, Air pollution, Vibration, Environmental Impact Assessment, Mitigative Measures, and Road site development and Arboriculture.

Text Books:

1. Traffic Engineering – McShane, W.R. and Roes, R.P. (Prentice Hall, New Jersey, 1990).
2. Traffic Engineering and Transport Planning – Kadiyali, L.R. (Khanna Publishers, Delhi, 1996).

Reference Books:

1. Transport Planning and Traffic Engineering – Flaherty, CAO'(Ed.) (John Wiley & Sons, Inc., New York, 1997)
2. Traffic Flow Fundamentals – May, A.D. (Prentice Hall, Englewood Cliffs, New Jersey, 1990).

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 7th

PracticalSubject: Structural Engineering Drawing - I Lab

Total Practical Periods: 40

PracticalSubject Code: 320761(20)

Maximum Marks: 40

Experiments to be performed (Min 10 experiments):

1. Drawing of plan and section of various types of bolted and welded joints.
2. Detailing of a Axially Loaded angle Tension Member
3. Detailing of an Axially Loaded Compression Member with base plate.
4. Detailing of an Axially Loaded Built up Laced Compression Member.
5. Detailing of an Axially Loaded Built up Battened Compression Member.
6. Detailing of a Riveted / Bolted Plate girder.
7. Detailing of a Welded Plate girder.
8. Detailing of flexible connections
9. Detailing of Semi – Rigid Connections
10. Detailing of Rigid Connections
11. Detailing of a Industrial shed
12. Detailing of a Truss Bridge Railway Bridge.
13. Preparation of Bill of Materials
14. Preparation of Fabrication drawings.
15. Preparation of Erection drawings.

List of Equipments / Machine Required:

1. List of Equipments – Not Required.

Text and Reference Books:

1. Design of Steel Structures – K. S. Sai Ram (Pearson Education)
2. Structural Steel Design : LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education)
3. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning)
4. Limit State Design of Steel Structures (IS:800-2007) – V. L. Shah, V. Gore (Structures Publications)

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 7th

PracticalSubject: Environmental Engineering - II Lab

Total Practical Periods: 40

PracticalSubject Code: 320762(20)

Maximum Marks: 40

Experiments to be performed (Min 10 experiments):

1. To determine acidity of Sewage / Industrial wastewater sample.
2. To determine Alkalinity of Sewage / Industrial wastewater sample.
3. To determine Hardness of Sewage / Industrial wastewater sample.
4. To determine Chloride Content of Sewage / Industrial wastewater sample.
5. To determine DO Content of Sewage / Industrial wastewater sample.
6. To determine Estimation of BOD of Sewage / Industrial wastewater sample.
7. To determine Optimum Coagulant Dose Test of Sewage / Industrial wastewater.
8. Determination of Total Solids in Sewage / Industrial wastewater.
9. Determination of Turbidity in Sewage / Industrial wastewater.
10. Determination of MPN in Sewage / Industrial wastewater.
11. Determination of COD in Sewage / Industrial wastewater.
12. Determination of Fluoride content in Sewage / Industrial wastewater.
13. Determination of Nitrates in Sewage / Industrial wastewater.
14. Determination of Phosphates in Sewage / Industrial wastewater.
15. Determination of Iron in Sewage / Industrial wastewater.
16. Microbiological Examination of Sewage / Industrial wastewater.

List of Equipments / Machine Required:

1. BOD Incubar
2. Turbidity meter
3. Microscope
4. pH meter
5. Muffle Furnace
6. Hot Air Oven
7. Jar Test Apparatus
8. Spectrophotometer

Text and Reference Books:

1. Environmental Engineering Lab Manual – Dr. B. Kottaiah & N. Kumaraswamy (Charotar Publications).
2. Environmental Science and Engineering – Henry and Heinke (Pearson Education).
3. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).
4. Introduction to Environmental Engineering and Science – Masters, G.M. (Prentice Hall of India Pvt. Ltd., 1991).

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 7th

PracticalSubject: Quantity Surveying and Cost Evaluation Lab

Total Practical Periods: 40

PracticalSubject Code: **320763(20)**

Maximum Marks: 40

Experiments to be performed (Min 10 experiments):

1. Estimating cost of a proposed building on Plinth area method, Volume area method.
2. Estimated cost of a proposed building from materials and labour by CBRI method.
3. Calculation of wall area in a building by measuring floor area for ordinary building and framed structure.
4. Calculation of approximate cost of water supply, sanitation, electrical works for a building.
5. Preparation of approximate estimate for road projects.
6. Preparation of detailed estimate of a building.
7. Analysis of rates: Concrete work, Brick work, Plaster, Flooring.
8. Use of PWD schedule of rates for determining cost of a building project.
9. Determination of present value of a building valuation.
10. Development method of valuation of plots in a locality.
11. Estimation of quantity of reinforcement and preparing bar bending schedule from a working and drawing for a building.
12. Rate analysis using software: R.C.C. items, Masonry work, Plastering, Road work.
13. Valuation by software.
14. Quantity estimate by estimation software.
15. Calculation of present value, anmity by software.

List of Equipments / Machine Required:

1. List of Equipments – Not Required.

Text & Reference Books:

1. Estimating and Costing – Rangawala (Charotar Publications).
2. Estimating and Costing – Dutta B.N. (UBS Publishers & Distributors).

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Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Common to all branches

Semester: 7th

PracticalSubject: Innovative & Entrepreneurial Skill

Total Practical Periods: 28

PracticalSubject Code: 320765(76)

Unit-1: Innovation

Innovation- an abstract concept; creativity, innovation and imagination; types of innovation - classified according to products, processes or business organizations.

Unit-2: Entrepreneurship

Who is an entrepreneur? Entrepreneurship- A state of Mind, Emergence of entrepreneur; Role of Entrepreneur; A Doer not a Dreamer- Characteristics of an entrepreneur; Factors affecting entrepreneurial growth – Social, cultural, personality factors, psychological and Social Factors. Impact of Entrepreneurship for sustainable development.

Unit-3:

Difference between entrepreneur and entrepreneurship, Difference between entrepreneur and intra-preneur, Common Entrepreneurial competencies/Traits; Entrepreneurship stimulants, Obstacles inhibiting Entrepreneurship; Types of entrepreneurs, Functions of an entrepreneur.

Unit-4: Identification of Business Opportunities

Introduction, Sources of Business of Product Ideas, Steps in Identification of Business opportunity and its SWOT Analysis.

Unit-5: Techno-Economic Feasibility of the project

Introduction, Techno- Economic feasibility of the Project, Feasibility Report, Considerations while preparing a Feasibility Report, Proforma of Feasibility Report, Role of Institutions and entrepreneurship.

Text and Reference Books:

1. Competing through Innovation-Bellon & Whittington, Prentice Hall of India
2. A Guide to Entrepreneurship – David Oates- JAICO Publishing House.
3. Entrepreneurship- Rober D Hisrich, Peters, Shepherd- TMH
4. Entrepreneurship in Action- Coulter, Prentice Hall of India
5. Entrepreneurship Management and Development – Ajith Kumar, HPH
6. Fundamentals of entrepreneurship- Mohanty, PHI
7. Patterns of Entrepreneurship- Jack M Kaplan, Wiley, student Edition.

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Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING & EXAMINATION

B.E. (Civil) – 8th SEMESTER

S. No.	Board of Study	Subject Code	Subject	Periods per Week			Scheme of Examination Theory/Pract.			Total Marks	Credit
				L	T	P	ESE	CT	TA		L+(T+P)/ 2
1	Civil Engg.	320831(20)	Structural Engineering Design - IV	4	1	-	80	20	20	120	5
2	Civil Engg.	320832(20)	Water Resources Engineering - II	4	1	-	80	20	20	120	5
3	Civil Engg.	320833(20)	Structural Analysis-III	4	1	-	80	20	20	120	5
4	Refer Table -3		Professional Elective - III	3	1	-	80	20	20	120	4
5	Refer Table -4		Open Elective - IV	3	1	-	80	20	20	120	4
6	Civil Engg.	320861(20)	Structural Engineering Drawing – II Lab	-	-	3	40	-	20	60	2
7	Civil Engg.	320862(20)	Water Resources Engineering Drawing Lab	-	-	3	40	-	20	60	2
8	Civil Engg.	320863(20)	Computer Applications in Civil Engineering Lab	-	-	3	40	-	20	60	2
9	Civil Engg.	320864(20)	Major Project	-	-	5	100	-	80	180	3
10	Civil Engg.	320865(20)	Report Writing and Seminar	-	-	2	-	-	40	40	1
11			Library	-	-	1	-	-	-	-	-
			Total	**18**	**5**	**17**	**620**	**100**	**280**	**1000**	**33**

L- Lecture; T- Tutorial; P- Practical; ESE- End Semester Exam; CT- Class Test; TA- Teacher's Assessment.

Table-3: Professional Elective III

S. No.	Board of Study	Subject Code	Subject
1	Civil Engg.	320841(20)	Industrial Waste Treatment
2	Civil Engg.	320842(20)	Advanced Environmental Engineering
3	Civil Engg.	320843(20)	Environmental Pollution and Management
4	Civil Engg.	320844(20)	Air Pollution and Control Measures
5	Civil Engg.	320845(20)	Prestressed Concrete Structures
6	Civil Engg.	320846(20)	Computer Applications in Civil Engineering
7	Civil Engg.	320847(20)	Seismic Design of Structures
8	Civil Engg.	320848(20)	Open Channel Flow
9	Civil Engg.	320849(20)	Water Resources Planning and Management
10	Civil Engg.	320850(20)	Water Shed Management

Table-4: Open Elective -IV

Elective -IV			
S.No.	Board of Studies	Code	Name of Subject
1	Management	300851(76)	Enterprise Resource Planning
2	Information Technology	300852(33)	E-Commerce & strategic IT
3	Management	300853(76)	Technology Management
4	Information Technology	300854(33)	Decision Support & Executive Information system
5	Computer Science & Engg.	300855(22)	Software Technology
6	Management	300856(76)	Knowledge Entrepreneurship
7	Management	300857(76)	Finance Management
8	Management	300858(76)	Project Planning, Management & Evaluation
9	Mechanical Engg.	300859(37)	Safety Engineering
10	Computer Science & Engg.	300801(22)	Bio Informatics
11	Mechanical Engg.	300802(37)	Energy Conservation & Management
12	Nanotechnology	300803(47)	Nanotechnology
13	Management	300804(36)	Intellectual Property Rights
14	Mech. Engg.	300805(37)	Value Engineering
15	Civil Engg.	300806(20)	Disaster Management
16	Civil Engg.	300807(20)	Construction Management
17	Civil Engg.	300808(20)	Ecology and Sustainable Development
18	Chem. Engg.	300809(19)	Non Conventional Energy Sources
19	Electrical Engg.	300810(24)	Energy Auditing and Management
20	Mechanical	300811(37)	Managing Innovation and Enterprenurship
21	Information Technology	300812(33)	Biometrics
22	Information Technology	300813(33)	Information Theory & Coding
23	Computer Science & Engg.	300814(22)	Supply Chain Management
24	Computer Science & Engg.	300815(22)	Internet & Web Technology
25	Electrical Engg.	300816(24)	Electrical Estimation and Costing
26	Electrical& Electronics Engg	300817(25)	Non Conventional Energy Sources

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.

(2) Choice of elective course once made for an examination cannot be changed in future examinations.

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 8th

Subject: Structural Engineering Design - IV

ESE Duration: 4 Hours

Subject Code: 320831(20)

Total Theory Periods: 50

Total Tutorial Periods: 12

Class Tests: 2

Assignments: 2

Maximum Marks: 80

Minimum Marks: 28

Objectives of the Subject:

1. Understand the behavior of combined footings.
2. Understand the behavior of retaining walls.
3. Understand the behavior of different types of water tanks.
4. Understand the behavior of different types of bridges.
5. Understand the behavior of prestressed concrete.

Outcomes of the Subject:

1. Capable of designing combined footings.
2. Capable of designing retaining walls.
3. Capable of designing simple water tanks.
4. Capable of designing of solid slab bridges
5. Capable of analyzing prestressed concrete beams.

Unit-1: Combined Footings

Limit State Design of Combined Rectangular and Combined Trapezoidal Footings, Introduction to design of strap footing and Raft Foundation.

Unit-2: Retaining walls

Limit State Design of Cantilever retaining wall with horizontal and sloping backfill, Counterfort Retaining Wall with horizontal backfill.

Unit-3: Water Tanks

Circular tank (resting on ground) with flexible / rigid joint between floor and wall (by approximate method), Design of Circular overhead tank with domed bottom and top (membrane analysis), Intze Tank (Membrane Analysis): Dimensions, Design of top dome, Top ring beam, cylindrical wall, middle ring beam, conical dome, bottom dome. Introduction to design of water tanks using IS Codes, Introduction to continuity analysis.

Unit-4: Bridges

Various types of Bridges, Loading for road bridges, Design of super structure for solid slab bridge, Design of canlilever slab for T-Beam bridge. Introduction to design of interior panels and girders of a T-Beam Bridge.

Unit-5: Prestressed Concrete

Basic concepts, classification and types of prestressing, Prestressing systems, Losses in Prestress, Properties of materials, merits and demerits of prestressed concrete, Analysis of beam for flexure, Kern distances and efficiency of Sections.

Text Books:

1. Reinforced Concrete Structures – B.C. Punmia (Laxmi Publications)
2. Prestressed Concrete – N. Krishna Raju (New Age Publications)
3. RCC Design – Sinha & Roy (S. Chand & Co.)

Reference Books:

1. RCC Structures – N. Krishna Raju (New Age Publications)
2. Bridge Engineering – R.K. Raina
3. IS codes

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 8th

Subject: Water Resources Engineering - II

ESE Duration: 4 Hours

Subject Code: 320832(20)

Total Theory Periods: 50

Total Tutorial Periods: 12

Class Tests: 2

Assignments: 2

Maximum Marks: 80

Minimum Marks: 28

Objectives of the Subject:

1. To understand about different types of dam and its design.
2. To understand the concepts of spillways.
3. To learn about diversion headwork's and its design.
4. Be familiar with different types of regulation works.
5. To understand the concepts of cross drainage works.

Outcomes of the Subject:

1. Students should be able to design the dams.
2. Students should be able to design the spillways.
3. Students should be able to design the weir and barrage.
4. Students should be able to design canal falls.
5. Students should be able to design different types of cross drainage works.

Unit-1: Dams

Types of Dams, Suitability of a type of dam, Gravity dams – Forces acting on dams, failure of dams and criteria for structural stability, Overturning, Compression or crushing, tension, sliding, principal and shear stress, stability analysis, Elementary profile of a gravity dam, High and low gravity dams, Profile from practical considerations, Design considerations, Openings in dams, Functions and Effects of opening, Joints, Keys and Water stops in gravity dams, Foundation treatment.

Unit-2: Spillways and Energy Dissipaters

Introduction, essential requirements of a spillway, spillway capacity, components, Types of spillways, Design of Ogee Spillway, Energy Dissipation below spillways, Types of Energy dissipater, Hydraulic jump as energy dissipater, Stilling basins, design of stilling basin, USBR stilling basins, standard basins.

Unit-3: Diversion Headworks

Introduction, Types of diversion works, location and components, Weir and Barrage, Effect of construction of weir on the river regime, Causes of failures of Weirs on permeable foundations, their remedies, Bligh's creep theory, Lane's Theory, Theory of seepage flow, Khosla's theory, Design of Vertical drop Weir, Design of Glacis Weir.

Unit-4: Regulation Work

Introduction, Definition of falls, necessity and location of falls, Design and comparative study of the main types of falls, Design of Cross regulator and distributary regulators.

Unit-5: Cross Drainage Works

Introduction, types, suitability, design of various types of C-D Works, Aqueduct, Syphon Aqueduct, Super Passage, Syphon, level crossing, inlets and outlets. Design of channel transition-expansions and contractions, curves for sub-critical and super critical flows.

Text Books:

1. Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications)
2. Irrigation Engineering – B.C. Punmia (Laxmi Publications)

Reference Books:

1. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)
2. Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand Bros.)
3. Irrigation Engineering – Asawa G.L. (New Age International Publications)
4. Fundamentals of Irrigation Engineering – Bharat Singh (Nem Chand & Bros.)

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 8th

Subject: Structural Analysis-III

ESE Duration: 3 Hours

Subject Code: 320833(20)

Total Theory Periods: 50

Total Tutorial Periods: 12

Class Tests: 2

Assignments: 2

Maximum Marks: 80

Minimum Marks: 28

Objectives of the Subject:

1. To learn about the approximate methods of analysis of multistory frames.
2. To learn about the flexibility method of analysis of structures.
3. To learn about the stiffness method of analysis of structures.
4. To learn about the finite element method of analysis of structures.
5. To learn about the basics of plastic analysis and methods of plastic analysis of beams and frames.

Outcomes of the Subject:

1. To be able to analyze multi story frames by approximate methods.
2. To be able to analyze beams and frames by flexibility method.
3. To be able to analyze beams and frames by stiffness method.
4. To be able to analyze, beams and frames by finite element method.
5. To be able to analyze beams and frames by plastic method of analysis.

Unit-1: Approximate Methods

Analysis of multistoreyed frames for horizontal loads by Cantilever and Portal Methods. Dead and Live Load (Substitute Frame) Analysis for multistoreyed buildings.

Unit-2: Flexibility Method

Introduction to Matrix method of analysis, formulation of flexibility matrices, application to simple problems involving not more than two unknowns, analysis of beams, rigid plane frames and pin jointed plane frames.

Unit-3: Stiffness Method

Formulation of stiffness matrices, application to simple problems involving not more than two unknowns, analysis of beams, rigid plane frames and pin jointed plane frames.

Unit-4: Finite Element Method

Cartesian and Natural Coordinates, Element DOF's, shape functions for bar, beams, triangular and rectangular element by generalized coordinates and by using Lagrange Polynomials, Pascal's triangle, assembly of stiffness matrix for springs, bar and beam element.

Unit-5: Plastic Analysis

Plastic Hinge Concept, Fully Plastic Moment, Collapse mechanism, plastic analysis of beam and frames.

Text Books:

1. Theory of Structures, Part – II – Punmia, Jain and Jain (Laxmi Publications).
2. Structural Analysis, a Matrix Approach – Gupta and Pandit.
3. Finite Element Analysis – S.S. Bhavikatti (New Age International Publishers, New Delhi).
4. Basic Structural Analysis – C. S. Reddy, Mc Graw Hill Education (India) Pvt. Ltd.

Reference Books:

1. Intermediate Structural Analysis – Wang. C.K. (Tata McGraw Hill).
2. Structural Analysis – Hibbeler (Pearson Education).
3. Desai C.S., Abel J.F., Introduction to the Finite Element Method, CBS Publishers & Distributors, Delhi.
4. Chandrupatla T.R., Belegundu A.D., Introduction to Finite Elements in Engineering, Prentice Hall of India Private Limited, New Delhi.

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 8th

Subject: Professional Elective-III (Industrial Waste Treatment)

ESE Duration: 3 Hours

Subject Code: 320841(20)

Total Theory Periods: 40

Total Tutorial Periods: 12

Class Tests: 2

Assignments: 2

Maximum Marks: 80

Minimum Marks: 28

Objectives of the Subject:

1. To learn about quality, quantity, treatment and disposal of industrial waste.

Outcomes of the Subject:

1. To be able to plan and handle the issues related to industrial waste.

Unit-1: General

Effect of discharge of industrial wastewaters on streams, land and environment, Importance and scope, Problems involved in treatment, Variation in quality and quantity of industrial wastewaters.

Standards & Criteria: Indian standards for discharge of treated wastewaters on land, into municipal sewer and natural water courses.

Sampling of Wastewaters: Representative sample, Grab and composite samples.

Unit-2: Effluent Quality and Quantity

Approaches to minimization – good housekeeping, equalization and neutralization by mixing of different effluent streams; recycling of wastewater streams. Process modifications in terms of raw materials and chemicals used Treatment of industrial wastes, Removal of dissolved and suspended solids, Organic waste treatment processes, Sludge treatment and handling.

Unit-3: General Approaches to Planning of Industrial Wastewater Treatment and Disposal

Equalization and proportioning, Neutralization Treating different effluent streams separately, Treating different streams jointly after mixing them partly or fully Including / excluding domestic wastewater along with the industrial waste Treating industrial wastewaters along with town waste.

Unit-4: General Approaches for Handling and Treatment of Specific Characteristics of Industrial Wastewaters

Stream Water Quality, DO Sag Curve, etc. Approaches for treating wastes having shock loads, colours, toxic metal-ions, refractory substances, e.g., ABS and other detergents, growth inhibiting substances such as insecticides, high concentration of nutrients (N.P.K., etc.), oil and grease, suspended solids, BOD., hot wastes, wastes with acidity, alkalinity, etc.

Unit-5: Process Flow Diagrams, Characteristics and Treatment of Various Industrial Wastes

Industrial wastes of pulp and paper, textile, tannery, food, canning, sugar mill, distillery, dairy, pharmaceutical, electroplating, etc. Industrial pollution abatement measures, referring to case studies in fertilizer industries, textile, petroleum refineries and distilleries.

Text Books:

1. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
2. Elements of Environmental Engineering – K.N. Duggal (S. Chand & Co., New Delhi)

Reference Books:

1. The Treatment of Industrial Wastes – Besselieure, E.B. and Schwartz, M. (McGraw Hill Kogakusha Ltd., New Delhi, 1969)
2. Industrial Water Pollution – Nemerow, N.L. (Ann Arbour, New York, 1978)
3. Waste Water Engineering – MetCalaff Eddy (Tata McGraw Hill, New Delhi)
4. Environmental Engineering – G.N. Pandey & G.C. Karney (Tata McGraw Hill, New Delhi)

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering	**Branch:** Civil Engineering
Semester: 8th	**Subject:** Professional Elective-III (Advanced Environmental Engineering)
ESE Duration: 3 Hours	**Subject Code: 320842(20)**
Total Theory Periods: 40	**Total Tutorial Periods:** 12
Class Tests: 2	**Assignments:** 2
Maximum Marks: 80	**Minimum Marks:** 28

Objectives of the Subject:

1. To learn about techniques to control air and water pollution and reclamation of waste water.

Outcomes of the Subject:

1. To be able to plan and handle issues related to air and water pollution.

Unit-1:

Concept of ecological principles, fundamental constituents of environment, Concept of productivity, Pollution and environmental health, pollution cost, Monitoring of pollution, environmental pollution, strategy for a livable environment, international institutions for environmental management.

Unit-2:

Air Pollution, introduction, effect of air pollution on the environment, sources of air pollution and control, biomedical aspects of air pollution, Meteorological aspects of air pollution, lapse rate, temperature inversion, adverse effects of air pollution.

Sources and effects of air pollutants like CO, nitrogen oxides, sulphur oxides, hydrocarbons, particulate matters.

Unit-3:

Water Pollution, What is water pollution, drinking water standards, quality of water for other uses, stream pollution and self purification natural streams, Streeter-Phelps Water Quality Model.

Biological treatment, design of A.S.P., trickling filter, oxidation pond, sludge treatment and disposal, disposal system and effluent discharge standards.

Unit-4:

Air pollution monitoring, stack monitoring system, high volume sampler, air quality standards for ambient air, mathematical modeling in air of pollution control, Box model, Gaussian Plume Model, air pollution from mobile sources and their control.

Unit-5:

Reclamation of waste water, radioactive waste management, eutrophication of lakes, measurement and detection of eutrophication, acid rain, global warning and green house effect, ozone depletion.

Indoor air pollution control measures, Occupational diseases and their impact on environment.

Text Books:

1. Waster Water Engineering – S.K. Garg (Khanna Publication).
2. Waste Water Engineering – B.C. Punmia (Laxmi Publication, New Delhi)

Reference Books:

1. Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
2. Water Supply and Sanitary Engineering – G.S. Birdi (Dhanpat Rai Publications).
3. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications).
4. Environmental Science and Engineering – Henry and Heinke (Pearson Education).
5. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering	**Branch:** Civil Engineering
Semester: 8th	**Subject:** Professional Elective-III (Environmental Pollution and Management)
ESE Duration: 3 Hours	**Subject Code: 320843(20)**
Total Theory Periods: 40	**Total Tutorial Periods:** 12
Class Tests: 2	**Assignments:** 2
Maximum Marks: 80	**Minimum Marks:** 28

Objectives of the Subject:

1. To learn about basic principles of environmental pollution and its management and about sustainable development.

Outcomes of the Subject:

1. To be able to plan and handle issues related to environmental pollution and its management and sustainable development.

Unit-1:

Basic principles of environmental management, its Pollution and control, Environmental Policies and Legislation, Rules, acts, standards, criteria, specification, nature and scope of environmental problems.

Unit-2:

Ecology of population, population attributes world population growth and the effect of overcrowding on ecology, economy and the future of man.

Unit-3:

Environmental Research Methodology, approaches, method of Data collection, sampling systems, approach to environmental problems, health and environmental implications of solid waste management, Fate of pollutants in air, water, soil and ground water.

Unit-4:

Management and handling of hazardous substances, Sanitary landfills, incineration, composting, hydropulping, pyrolysis. Environmental Audit, The Indian Scenario, definition of audit, procedure of auditing.

Unit-5:

Introduction to sustainable development, Definitions, strategies for sustainable development, environmental debts, appropriate technologies, related case studies.

Environmental inventory, Environmental Impact Assessment methods, Basic steps for prediction and assessment, water environment, air environment, noise environment.

Text Books:

1. Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
2. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)

Reference Books:

1. Introduction to Environmental Engineering and Science – Masters, G.M. (Prentice Hall of India Pvt. Ltd., 1991)
2. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi)
3. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
4. Environmental Science and Engineering – Henry and Heinke (Pearson Education)
5. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi)

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering	**Branch:** Civil Engineering
Semester: 8th	**Subject:** Professional Elective-III (Air Pollution and Control Measures)
ESE Duration: 3 Hours	**Subject Code: 320844(20)**
Total Theory Periods: 40	**Total Tutorial Periods:** 12
Class Tests: 2	**Assignments:** 2
Maximum Marks: 80	**Minimum Marks:** 28

Objectives of the Subject:

1. To know about various causes the effects of air pollution.

Outcomes of the Subject:

1. To be able to plan and handle issues related to air pollution and its control.

Unit-1: Air Pollution

Problem, Definitions, Classification of pollutants, characteristics and sources.

A.P. Monitoring: Measurement of stack gases, Sampling methods, Difficulties in sampling, sampling of SPM, stack sampling techniques.

Unit-2:

Air pollution meterology, stability class condition, plume behaviour, topographical effects on air pollution, wind profiles, wind roses. Gaussian plume models, assumptions and limitations of GPM, problem on modelling.

Unit-3:

SOX sources, ambient concentrations, test methods, SOX control techniques, effects of SOX on human, animal health, plants and on materials. NOX sources, ambient concentrations, test method control techniques, effects of NOX on human health, animal health, plants and on materials. Particulate size distribution, collection and removal mechanics.

Unit-4:

Major air pollution disaster episodes, special diseases caused by air pollution, symptoms of chronic air pollution. Mechanisms of deterioration in polluted atmospheres, effect of air pollution on art treasures in India.

Unit-5:

Air quality criteria and emission standards, US and Indian standards, air pollution act, constitution, power and functions of the boards. Global effects of air pollution – Green house effect, acid rains, ozone layer depletion, etc.

Text Books:

1. Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
2. Environmental Science and Engineering – Henry and Heinke (Pearson Education).

Reference Books:

1. Air Pollution – Henry C. Perkins, (McGraw Hill Kogakusha Ltd., Tokyo, Japan, 1974)
2. Air Pollution – Stern, Arthur C. (Academic Press, New York, USA, 1977)
3. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
4. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering	**Branch:** Civil Engineering
Semester: 8th	**Subject:** Professional Elective-III (Prestressed Concrete Structures)
ESE Duration: 3 Hours	**Subject Code: 320845(20)**
Total Theory Periods: 40	**Total Tutorial Periods:** 12
Class Tests: 2	**Assignments:** 2
Maximum Marks: 80	**Minimum Marks:** 28

Objectives of the Subject:

1. To learn about the methods, systems, materials, analysis and design of prestressed concrete structures.

Outcomes of the Subject:

1. To be able to analyse and design prestressed concrete structures.

Unit-1: Methods, Systems and Materials

Basic principles, methods and systems of prestressing, external, internal, full, partial, pre-tensioning and post-tensioning, quality of concrete and steel, I.S. Code provisions for allowable stresses, Advantages of prestressing and importance of high strength materials.

Unit-2: Analysis of Structures for Flexure

Cases of axial and eccentric prestressing allowing suitable percentage loss of prestress. Stresses in concrete at various stages, lever arm concept and center of pressure, pressure line, kern distances, load balancing cable profiles, critical span (for solid slabs only), Efficiency of a section.

Unit-3: Losses of Prestressing

Various types of losses of prestress and their calculation, loss due to friction, I.S. Code provisions, Elastic shortening due to successive tensioning of cables.

Design of section for flexure: I.S. Code provisions for cover and spacing, standard Fressinet and Gifford Udall cables, Design of beams and slabs, cable zones and profiles.

Unit-4: Composite Beams

Different types, Loading conditions, analysis for stresses, differential shrinkage.

Bond and Anchorage: Bond stress and its significance in pre-tensioned beams, transmission length, determination of bursting force due to anchor zone stresses and provision of steel according to I.S. Code for prestressed concrete.

Shear: Calculation of diagonal tension and its inclination (including vertical prestressing also) provision of steel according to elastic method and I.S. Code method, advantages of prestressing.

Unit-5: Limit State Design

Limit state of serviceability and strength, calculation of ultimate bending moment for given sections, advantages of limit state method over working stress method.

Miscellaneous uses: Analysis and design of poles and circularly prestressed pipes and tanks.

Text Books:

1. Prestressed Concrete – Krishna Raju N. (New Age International)

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering	**Branch:** Civil Engineering
Semester: 8th	**Subject:** Professional Elective-III (Computer Applications in Civil Engineering)
ESE Duration: 3 Hours	**Subject Code: 320846(20)**
Total Theory Periods: 50	**Total Tutorial Periods:** 12
Class Tests: 2	**Assignments:** 2
Maximum Marks: 80	**Minimum Marks:** 28

Objectives of the Subject:

1. To learn about various computer applications using programming language C++.

Outcomes of the Subject:

1. To be able to prepare computer programs of similar type of Civil Engineering Applications.

Unit-1:

C++ program for Reynolds no, Froude no in pipe for laminar and turbulent flow, friction factor in pipes for laminar and turbulent flows, discharge in open rectangular and trapezoidal open channel, hardy cross method for water supply distribution.

Unit-2:

C++ program for determination of earliest expected time for an activity network analysis, determination of reduced level of various points by rise and fall method and HI method, convert whole circle bearing to reduced bearing, calculation of local attraction by observed bearing of a closed traverse.

Unit-3:

C++ program for Determination of vertical effective stress at a given depth for any soil profile, determination of bearing capacity of soil for given water table condition, determination of one dimensional preconsolidation settlement under compacted fill. Determination of horizontal and vertical hydraulic conductivities for flow through anisotropic soil.

Unit-4:
C++ program for SF & BM at any desired section of a simply supported beam for point load and udl. Determination of maximum shear force at a section of a simply supported beam, calculation of simple stress, strain of a section. Calculation of bending stress of a desired section of a beam.

Unit-5:
C++ program for
RCC: IS:456 -- moment of resistance of a rectangular beam section by limit state method, safe load carrying capacity of a column, area of steel required of a rectangular beam section.

Steel: Calculate the safe compressive load of a given section by IS: 800 – 2007, calculation of number of rivets required for connecting an angle section the gusset plate.

Text Books:

1. Let us C++ – Yeshwant Kanitkar (BPB Publications)
2. Problem Solving with C++ – Savitch (Addison Wesley Publication)

Reference Books:

1. C++ Interactive Course – Lafore (BPB Publications)
2. C++ Components and Algorithms – et. al. (BPB Publications)
3. Object Oriented Programming in Turbo C++ – Rober Lafore (Galgotia Publications)

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Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering | **Branch:** Civil Engineering

Semester: 8th | **Subject:** Professional Elective-III (Seismic Design of Structures)

ESE Duration: 3 Hours | **Subject Code: 320847(20)**

Total Theory Periods: 50 | **Total Tutorial Periods:** 12

Class Tests: 2 | **Assignments:** 2

Maximum Marks: 80 | **Minimum Marks:** 28

Objectives of the Subject:

1. To learn about basic principles of seismic design of structures.

Outcomes of the Subject:

1. To be able to analyze, design and detail structures from seismic point of view.

Unit-1: Engineering seismology

Causes of earthquakes; seismic waves; magnitude, intensity and energy release, characteristics of strong earthquake ground motions, Introduction to theory of vibrations - Flexibility of long and short period structures, concept of response spectrum, Seismic zones.

Unit-2: Seismic design concepts

Desirable features of earthquake resistant buildings, Building forms for earthquake resistance, Seismic design philosophy, Performance of buildings in past earthquakes, Lessons from structural damage during past earthquakes, Equivalent static lateral earthquake force, codal provisions.

Unit-3: Single degree of freedom systems

Response of single degree freedom system, free & forced vibrations.

Unit-4: Multi degree of freedom structures

Free vibrations of two and three degree of freedom systems.

Unit-4: Design of Buildings

Determination of Lateral forces due to earthquake in RCC & Steel framed structures.

Text Books:

1. Earthquake Resistant Design of Structures – S. K. Duggal, Oxford University Presss
2. Dynamics of Structures: Theory and Application to Earthquake Engineering (2nd edition) – Anil K Chopra (Pearson Education Publication)
3. Earthquake Resistant Design of Structures – Pankaj Agrawal & Manish Shrikhande, PHI Learning Pvt. Ltd.
4. IS 1893, IS 13920, IS 4326, IS 13828, Bureau of Indian Standards, New Delhi

Reference Books:

1. Design of Earthquake Resistant Buildings – Minoru Wakabayashi (McGraw Hill Publication)
2. Vibration and Structural Dynamics – Timoshenkeo, S. (VanNostrand Co.)
3. Vibration and Structural Dynamics – Mukyopadhyaya (Oxford & IBH)
4. Structural Dynamics (Theory & computations)- Mario Paz (CBS Publishers & Distributions New Delhi)

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 8th

Subject: Professional Elective-III (Open Channel Flow)

ESE Duration: 3 Hours

Subject Code: 320848(20)

Total Theory Periods: 40

Total Tutorial Periods: 12

Class Tests: 2

Assignments: 2

Maximum Marks: 80

Minimum Marks: 28

Objectives of the Subject:

1. To learn about uniform and non-uniform flow in Open Channels and the difference between pipe flow and open channel flow.

Outcomes of the Subject:

1. To be able to plan and handle issues related to open channel flow.

Unit-1: Introduction

Difference between open channel flow and pipe flow, geometrical parameters of a channel, continuity equation.

Uniform flow: Chezy's and Manning's equations for uniform flow in open channel, velocity distribution, most efficient channel section.

Unit-2: Energy and Momentum Principles

Critical depth, concepts of specific energy and specific force, application of specific energy principle for interpretation of open channel phenomena, flow through vertical and horizontal contractions.

Unit-3: Non-Uniform Flow in Open Channel

Equation of gradually varied flow and its limitations, flow classification and surface profiles, integration of varied flow equation by analytical, graphical and numerical methods, flow in curved channels.

Unit-4: Hydraulic Jump, Surges, Water Waves

Classical hydraulic jump, evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds, equation of motion for unsteady flow, open channel surge, celerity of the gravity wave, deep and shallow water waves.

Unit-5: Spatially-varied flow

Introduction, SVF with increasing discharge, differential equation of SVF with increasing discharges, control point, classification and solutions, profile computation, SVF with decreasing discharge, differential equation for SVF with decreasing discharge, computations.

Text Books:

1. Fluid Mechanics – A.K. Jain (Khanna Publication)
2. Open Channel Flow – Subramanya (Tata McGraw Hill, New Delhi)

Reference Books:

1. Engineering Fluid Mechanics (including Hydraulic Mechanics) (2nd Edition) – Garde, R.J., and A.G. Mirajgaoker (Nem Chand & Bros., Roorkee, 1983)
2. Flow Through Open Channels – Ranga Raju, K.G. (Tata McGraw Hill, New Delhi, 1993)
3. Experimental Fluid Mechanics (Vol. 2) – Asawa, G.L. (Nem Chand and Bros., 1992)
4. Open Channel Flow – Ven Te. Chow (McGraw Hill)

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering	**Branch:** Civil Engineering
Semester: 8th	**Subject:** Professional Elective-III (Water Resources Planning and Management)
ESE Duration: 3 Hours	**Subject Code: 320849(20)**
Total Theory Periods: 40	**Total Tutorial Periods:** 12
Class Tests: 2	**Assignments:** 2
Maximum Marks: 80	**Minimum Marks:** 28

Objectives of the Subject:

1. To learn about various techniques related to water resources planning and management.

Outcomes of the Subject:

1. To be able to plan and handle issues related to water resources planning and management.

Unit-1: Introduction

Role of water in national development, assessment of water resources of country, scope of water resources development vis-a-vis environment, Irrigation development in India, utilisation of Irrigation potential.

Unit-2: Planning

Water resources planning process; planning for single purpose and multipurpose projects, estimation of different water needs and project formulations, comparison of alternatives, cost-benefit analysis.

Unit-3: Water Resources Systems

Definition, types of system, optimization techniques, system approach, system analysis, linear programming, formulation of a linear programming problem, formulation with different types of constraints, graphical analysis, graphical solution, simplex method, optimization techniques and systems approach.

Unit-4: Management

Evaluation and monitoring of water quantity and quality, managing water distribution networks for irrigation, flood control and power generation, inter-basin transfer of water, conjunctive use of surface and ground water.

Unit-5: Modelling

Water quantity and quality modelling, evaluation of impacts of water resources projects on river regimes and environment, reservoir sedimentation and watershed management.

Text Books:

1. Principles of Water Resources Planning – Good Man, A.S., (Prentice Hall, Inc., Englewood Cliffs, N.J. 1984.)
2. Water Resources Engineering – Linsley, R.K. and Franzini, J.B., (3rd Edition) (McGraw Hill, New York, 1979)

Reference Books:

1. Water Resources System, Planning and Management – M.C. Chaturvedy (Tata McGraw Hill)
2. System Approach to Water Management – Biswas A.K. (Tata McGraw Hill)
3. Water Resources System, Planning and Management – Helweg O.J. (John and Wiley & Sons)

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering
Branch: Civil Engineering
Semester: 8th
Subject: Professional Elective-III (Water Shed Management)
ESE Duration: 3 Hours
Subject Code: 320850(20)
Total Theory Periods: 40
Total Tutorial Periods: 12
Class Tests: 2
Assignments: 2
Maximum Marks: 80
Minimum Marks: 28

Objectives of the Subject:

1. To learn about soil and land classification with a point of view planning for water shed management.

Outcomes of the Subject:

1. To be able to plan and handle issues related to planning for water shed management.

Unit-1:

Soil and Water, Issues related to plant life like composition of soil, water requirement of crops, necessary conditions for plant growth etc. Soils, their origin and classification.

Unit-2:

Land classification for WM, Land capability rating, determination of land capability class, land capability and suitability surveys.

Unit-3:

Soil erosion, problem, types, conservation, and control measures in agricultural and non-agricultural land. Water conservation and Harvesting, Agronomical measures in soil and water conservation. Examples and critical reviews.

Unit-4:

Watershed Management, Approach in Govt. programmes, people's participation, conservation farming, watershed-management planning, identification of problems, objectives and priorities, socioeconomic survey, use of tools like GIS.

Unit-5:

Hill slope processes, forest and land use, hill slope conservation. Bad Lands, bad land development.

Text Books:

1. Watershed Management – J.V.S. Murthy (New Age International Ltd.)

Reference Books:

1. Watershed Management – B.M. Tideman
2. Modern physical geography – Strahler A.N. and Strahler A.H.

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 8th

Subject: Open Elective-IV (Disaster Management)

ESE Duration: 3 Hours

Subject Code: 300806(20)

Total Theory Periods: 40

Total Tutorial Periods: 12

Class Tests: 2

Assignments: 2

Maximum Marks: 80

Minimum Marks: 28

Objectives of the Subject:

1. To introduce disaster, its nature and types.
2. To understand disaster zoning and hazard assessment.
3. To know about the disaster mitigation and preparedness.
4. To understand management during disaster and construction technology for its mitigation.
5. To identify relief measures.

Outcomes of the Subject:

1. Students are expected to understand disaster and its nature.
2. Students are expected to understand impact and hazard assessment.
3. Students are expected to understand disaster preparedness and mitigation.
4. Students are expected to understand use of construction technology for disaster management.
5. Students are expected to identify short term and long term relief measures.

Unit-1:

Nature of disasters – natural and other disasters, Earthquakes, floods, draught, cyclones, fire and other environmental disasters.

Unit-2:

Behaviour of structures in disaster prone areas, Disaster zoning, Hazard assessment, Environmental Impact Assessment

Unit-3:

Methods of mitigating damage during disasters, disaster preparedness.

Unit-4:

Management systems during disasters, Construction Technology for mitigation of damage of structures.

Unit-5:

Short-term and long-term relief measures.

Text Books:

1. Design of Earthquake Resistant Buildings – Minoru Wakabayashi (McGraw Hill Publication)
2. Dynamics of Structures: Theory and Application to Earthquake Engineering (2nd edition) – Anil K Chopra (Pearson Education Publication)

Reference Books:

1. Fundamentals of Vibrations – Anderson, R.A. (Mc Millan)
2. IS – 1893 (Part I): 2002, IS – 13920: 1993, IS – 4326: 1993, IS-13828: 1993
3. Earth quake engineering damage assessment and structural design – S.F. Borg
4. Disasters and development – Cuny F (Oxford University Press Publication)

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Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 8th

Subject: Open Elective-IV (Construction Management)

ESE Duration: 3 Hours

Subject Code: 300807(20)

Total Theory Periods: 40

Total Tutorial Periods: 12

Class Tests: 2

Assignments: 2

Maximum Marks: 80

Minimum Marks: 28

Objectives of the Subject:

1. To provide an understanding of owners perspective towards life cycle of project and the changing environment of construction industry.
2. To provide an understanding of organizing for project management.
3. To provide an understanding of innovation, feasibility and value engineering in design and construction.
4. To provide an understanding of labour, material and equipment utilization.
5. To provide an understanding of approaches to cost estimation in construction project.

Outcomes of the Subject:

1. Students should be able to identify owner's perspective / perspective of project participants towards construction projects.
2. Students are expected to identify the structure of project participant's organization and effect of project risks.
3. Students are expected to know design methodology, feasibility aspect and value engineering in design and construction.
4. Students are expected to know importance of labour productivity, material and equipment utilization.
5. Students are expected to know the different approaches of cost estimation of construction project.

Unit-1: The Owner's Perspective

Introduction-The project life cycle-Major Types of Construction-Selection of Professional Services-Construction contractors-Financing of constructed facilities-Legal and regulatory Requirements-The changing Environment of the construction Industry-The Role Project Managers.

Unit-2: Organizing for Project Management

Definition of project management, Trends in Modern Management-Strategic planning and project programming- Effects of project risks on organization-Organization of Project Participants-Traditional designer-Constructor sequence- Professional construction management-Owner-Builder-Operation-Turnkey operation-Leadership and Motivation for the Project team-Interpersonal behaviour in project organization-perceptions of Owners and Contractors.

Unit-3: The Design and Construction Process

Design and construction as an integrated system-Innovation and technological Feasibility-Innovation and technological feasibility-Design Methodology-Functional Design-Physical Structures-Construction Site Environment-Value engineering, Value Management and Value Planning-Construction Planning-Industrialized Construction and Prefabrication-Computer -Aided Engineering.

Unit-4: Labour, Material and Equipment Utilization

Historical Perspective – Labour Productivity-Factors Affecting Job-Site Productivity-Labor Relations in construction-Problems in collective bargaining-Materials Management-Materials Procurement and Delivery- Inventory control-Tradeoffs of cost in Material Management-Construction Equipment-Choice of Equipment and Standard production Rates-Construction Processes Queues and Resource Bottlenecks

Unit-5: Cost Estimation

Costs Associated with Construction Facilities-Approaches to cost estimation-Type of construction cost estimates- Effects of scale on construction cost-Unit cost-Method of estimation-Historical cost data-Cost indices-Applications of cost Indices to Estimating-Estimate based on Engineers List of Quantities-Allocation of Construction costs over time-Estimation of operating costs, concept of pre and post construction cost management.

Text Books:

1. Construction Project Management Planning, Scheduling and Control – Chitkara, K.K. (Tata McGraw Hill Publishing Co., New Delhi, 1998)
2. Project Management: A systems Approach to Planning, Scheduling and Controlling – Harold Kerzner (CBS Publishers & Distributors, Delhi, 1988)

Reference Books:

1. Project management for Construction: Fundamental Concepts for owners, Engineers, Architects and Builders – Chris Hendrickson and Tung Au, (Prentice Hall, Pitsburgh, 2000).
2. Construction Project Management – Frederick E. Gould (Wentworth Institute of Technology, Vary E. Joyce, Massachususetts Institute of Technology, 2000).
3. Project Management – Choudhury, S. (Tata McGraw Hill Publishing Co., New Delhi, 1988).
4. Applied project Engineering and Management – Ernest E. Ludwig (Gulf Publishing Co., Houstan, Texas, 1988).
5. Construction cost management, learning from case studies – Keith Potts, Taylor and Francis, London and New York.

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering	**Branch:** Civil Engineering
Semester: 8th	**Subject:** Open Elective-IV (Ecology and Sustainable Development)
ESE Duration: 3 Hours	**Subject Code: 300808(20)**
Total Theory Periods: 40	**Total Tutorial Periods:** 12
Class Tests: 2	**Assignments:** 2
Maximum Marks: 80	**Minimum Marks:** 28

Objectives of the Subject:

1. To learn about the nature of ecology and sustainable development and various obstacles in sustainable development.

Outcomes of the Subject:

1. To be able to plan and handle issues related to sustainable development.

Unit-1: Nature of ecology and sustainable development

Definition, scope of ecology and sustainable development, geomorphology, oceanography, climatology and biogeography.

Unit-2: Energy and environment

Introduction of energy environment, use of solar cells for heating and operated drills, methane gas digesters, environmentally friendly method of energy conservation, difference between conventional and non-conventional energy sources, future trends of energy systems.

Unit-3: Theory of isostasy

Concept of isostasy for sustainable development, discovery of the concept, concept of Hayford and Bowie, Joly, and Holmes, Global isostatic adjustment.

Unit-4: Physical geography and man human impact on the natural environment

Modification of land forms, direct alternation of land forms, wind deflation, coastal erosion and deposition, modification of the atmosphere, ultration process in eco and energy systems.

Unit-5: Obstacles in sustainable development

Pollution growth, species extinction, restriction of bat lands, desertification, soil erosion, soil pollution, characterisation of contaminated soil, global warming and ozone depletion etc.

Text Books:

1. Energy and environment – Fowler (McGraw Hill, New Delhi)
2. Restoration Ecology and sustainable development – Krystyna M. Urbanska et.al. (Cambridge University Press, U.K.)

Reference Books:

1. Reuniting Economy and Ecology in Sustainable Development – Russ Beaton et.al.
2. Theory and implementation of economic models for sustainable development – Jeroen C.J.M. Van Den Bergh
3. Economy and Ecology: Towards sustainable development – F. Archibugi et.al.
4. Evaluating Sustainable Development: Giving People a voice in their destiny – Okechukwu Ukaga et.al.

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 8th

Subject: Structural Engineering Drawing-II Lab

Total Practical Periods: 40

PracticalSubject Code: 320861(20)

Total Marks in End Semester Exam: 40

Experiments to be performed (Min 10 experiments):

1. Details of reinforcement in a simply supported RCC beam (singly reinforced) with the given design data regarding the size and number of bars, stirrups their size and spacing.
2. Details of reinforcement in a simply supported RCC beam (doubly reinforced) with the given design data regarding the size and number of bars, stirrups their size and spacing.
3. Details of reinforcement in a simply supported RCC beam (T section) with the given design data regarding the size and number of bars, stirrups their size and spacing.
4. Details of reinforcement in a one way slab with the given design data regarding the size and number of bars, their size and spacing.
5. Details of reinforcement in a two way slab with the given design data regarding the size and number of bars, their size and spacing.
6. Details of reinforcement in a stair case with the given design data regarding the size and number of bars, their size and spacing.
7. Details of reinforcement for a RCC rectangular column with isolated footing.
8. Details of reinforcement for a RCC circular column with isolated square footing.
9. Detailing of Combined footings.
10. Detailing of Retaining walls.
11. Detailing for Water Tanks.
12. Detailing for R.C.C. slab Bridge.
13. Detailing for R.C.C. T-Beam Bridge.
14. Detailing for Prestressed Concrete Girder.
15. Bar bending schedules for few of the above items.

Field Visit (Minimum 3 times):

Study of complete standard drawing:

1. Multistoried building
2. Bridge
3. Water tank

List of Equipments / Machine Required:

1. List of Equipments – Not Required.

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 8th

Subject: Water Resources Engineering Drawing Lab

Total Practical Periods: 40

PracticalSubject Code: 320862(20)

Total Marks in End Semester Exam: 40

Experiments to be performed (Min 10 experiments):

1. Drawing of gravity dam section showing following details: openings in dams, joints, key and water stops.
2. Drawing of Earth dam section showing details of different types of earth dam.
3. Drawing of Ogee Spillway section.
4. Drawing of different types of energy dissipater and stilling basins.
5. Drawing of layout of diversion head works showing its different components.
6. Drawing of vertical drop weir.
7. Drawing of Glacis weir.
8. Drawing of canal head regulator.
9. Drawing of main types of canal fall.
10. Drawing of different types of hydraulic gates.
11. Drawing of aqueduct.
12. Drawing of Syphon Aqueduct.
13. Drawing of Super Passage.
14. Drawing of Canal Syphon.
15. Drawing of Level Crossing and inlets and outlets.

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Civil Engineering

Semester: 8th

Subject: Computer Applications in Civil Engineering Lab

Total Practical Periods: 40

PracticalSubject Code: 320863(20)

Total Marks in End Semester Exam: 40

Experiments to be performed (Min 10 experiments):

1. Computer Programs / Design in Civil Engineering Software Packages.

List of Equipments / Machine Required:

1. PC system.
2. Turbo C++ compiler.

Text Books:

1. Let us C++ – Yeshwant Kanitkar (BPB Publications)
2. Problem Solving with C++ – Savitch (Addison Wesley Publication)

Chhattisgarh Swami Vivekanand Technical University Bhilai (C.G.)

Name of program: Bachelor of Engineering

Branch: Common to all branches

Semester: 8th

Subject: Report Writing and Seminar

Total Theory Periods: 28

Subject Code: 320865(20)

Class Tests: 2

Teachers Assessment: 40 Marks

Objectives of the Subject:

1. To learn about the nature of ecology and sustainable development and various obstacles in sustainable development.

Outcomes of the Subject:

1. To be able to plan and handle issues related to sustainable development.

Unit-1: Introduction to Technical Writing

How differs from other types of written communication Purpose of technical writing, Correspondence: prewriting, writing and rewriting Objectives of Technical Writing. Audience Recognition: High-tech audience, Low tech audience, Lay audience, Multiple Audience.

Unit-2: Correspondence

Memos, Letters, E-mails, Its differentiation, types of letters, Document Design, its importance, Electronic Communication: Internet, Intranet, extranet, Writing effective e-mail.

Unit-3: Summary

Report Strategies, Effective style of technical report writing: Structures: content, introduction, conclusions, references, etc., Presentation, Writing first draft, revising first draft, diagrams, graphs, tables, etc. report lay-out.

Unit-4: Report Writing

Criteria for report writing, Types of Report: Trip report, Progress report, lab report, Feasibility report, project report, incident report, etc., Case Studies.

Unit-5: Proposals & Presentation

Title page, Cover letter, Table of Content, list of illustrations, summary, discussion, conclusion, references, glossary, appendix, Case Studies, Oral Presentation/ Seminar.

Text Books:

1. Sharon J. Gerson & Steven M. Gerson "Technical Writing - Process& Product", Pearson Education.

Reference Books:

1. Sunita Mishra, "Communication Skills for Engineers" Pearson Education
2. Davies J.W. "Communication for engineering students", Longman
3. Eisenberg, "Effective Technical Communication", Mc. Graw Hill.

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