ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

COURSE STRUCTURE AND SYLLABUS

For UG –R22

B. TECH - CIVIL ENGINEERING

(Applicable for batches admitted from 2022-2023)

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

Revised on 06th July 2024 after 4th BoS Meeting

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

COURSE STRUCTURE FOR B. Tech CIVIL ENGINEERING (R22)

Semester I (First year)

S.NO	Category	Course name	L	T	P	C	INT	EXT	TOT
1	BS	Mathematics – I	3	1	--	3	30	70	100
2	HS	Communicative English	3	1	--	3	30	70	100
3	BS	Engineering Chemistry	3	1	--	3	30	70	100
4	ES	Building Materials & Construction	3	1	--	3	30	70	100
5	ES	Programming for Problem Solving using C	3	1	--	3	30	70	100
6	HS	English Communication Skills Laboratory	--	--	3	1.5	15	35	50
7	BS	Engineering Chemistry Laboratory	--	--	3	1.5	15	35	50
8	ES	Programming for Problem Solving Using C Lab	--	--	3	1.5	15	35	50
9	MC	Environmental Science	2	--	--	0	--	--	0
Total Credits /Marks						**19.5**			**650**

Semester II (First year)

S.NO	Category	SUBJECT	L	T	P	C	INT	EXT	TOT
1	BS	Mathematics - II	3	1	--	3	30	70	100
2	BS	Engineering Physics	3	1	--	3	30	70	100
3	ES	Engineering Mechanics	3	1	--	3	30	70	100
4	ES	Engineering Geology	3	1	--	3	30	70	100
5	ES	Engineering Drawing	2	--	4	3	30	70	100
6	BS	Engineering Physics Lab	--	--	3	1.5	15	35	50
7	ES	Engineering Geology Lab	--	--	3	1.5	15	35	50
8	ES	Civil Engineering Workshop	--	--	3	1.5	15	35	50
9	MC	Constitution of India	2	--	--	0	--	--	0
Total Credits/ Marks						**19.5**			**650**

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III-SEMESTER

S.NO	Category	SUBJECT	L	T	P	C	INT	EXT	TOT
1	PC	Building Planning and Drawing	3	1	0	3	30	70	100
2	PC	Surveying -I	3	1	0	3	30	70	100
3	PC	Strength of Materials -I	3	1	0	3	30	70	100
4	PC	Fluid Mechanics	3	1	0	3	30	70	100
5	PC	Concrete Technology	3	1	0	3	30	70	100
6	PC	FM & HM Lab	0	0	3	1.5	15	35	50
7	PC	Strength of Materials Lab	0	0	3	1.5	15	35	50
8	PC	Concrete Technology Lab	0	0	3	1.5	15	35	50
9	SC	SOC: Surveying Field Work I	1	0	2	2		50	50
Total Credits/Marks						**21.5**			**700**

**end of 2-1 start Community Service project evaluated end of 2-2 semester*

IV –SEMESTER

S.NO	Category	SUBJECT	L	T	P	C	INT	EXT	TOT
1	BS	Mathematics –III	3	1	0	3	30	70	100
2	PC	Surveying -II	3	1	0	3	30	70	100
3	PC	Strength of Materials -II	3	1	0	3	30	70	100
4	PC	Hydraulics and Hydraulic Machinery	3	1	0	3	30	70	100
5	PC	Environmental Engineering	3	1	0	3	30	70	100
6	PC	Surveying Field Work -II	0	0	3	1.5	15	35	50
7	PC	FM Lab	0	0	3	1.5	15	35	50
8	PC	Environmental Engineering Lab	0	0	3	1.5	15	35	50
9	SC	SOC: Surveying Field Work II	1	0	2	2		50	50
10	PW	Community Service Project				4		100	100
Total Credits/Marks						**25.5**			**800**
11		Minor	3	0	0	3			
12		Honors (The hours distribution can be 3-0-2 or 3-1-0 also)	4	0	0	4			

**end of 2-2 start of internship to be evaluated during V Semester (third year)*

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

V – SEMESTER

S.No	Category	Subject	L	T	P	Credits	Int	Ext	Total
1	PC	Structural Analysis	3	1	0	3	30	70	100
2	PC	Geotechnical Engineering -1	3	1	0	3	30	70	100
3	PC	Design and Drawing of Concrete Structures	3	1	0	3	30	70	100
4	OE-1	a) Strength of Materials b) Elements of Civil Engineering c) Surveying and Geometrics	3	1	0	3	30	70	100
5	PE-1	a) Industrial waste water management b) Watershed Management c) Green Buildings	3	1	0	3	30	70	100
6	PC	Geotechnical Engineering -Lab	0	0	3	1.5	15	35	50
7	PC	Auto CAD lab	0	0	3	1.5	15	35	50
8	OC	Internship 2 months (Mandatory) after second year *	0	0	3	1.5	0	50	50
9	SC	Skill advanced course Design of Special Structures	1	0	2	2	0	50	50
10	IIS	Environmental Health and Safety	3	0	0	0	30	70	
11	HONORS/ MINORS COURSE	Honors/Minor Courses	3	1	0	0	30	70	
Total Credits/Marks						**21.5**			**700**

**to be evaluated during V Semester*

VI- SEMESTER

S.No	Category	Subject	L	T	P	Credits	Int	Ext	Total
1	PC	Design and Drawing of Steel Structures	3	1	0	3	30	70	100
2	PC	Geotechnical Engineering -II	3	1	0	3	30	70	100
3	PC	Highway Engineering	3	1	0	3	30	70	100
4	PE-II	Environmental Impact Assessment Geospatial Technologies Road Safety Engineering	3	1	0	3	30	70	100
5	OE-II-1	Fluid Mechanics Environmental Engineering Disaster Management	3	1	0	3	30	70	100
6	SC	Skill Advanced Source (Ground Water modeling)	1	0	2	2		50	50
7	PC	STADD PRO Lab	0	0	3	1.5	15	35	50
8	PC	Transportation Engineering Lab	0	0	3	1.5	15	35	50
9	SC	Employability Skills	1	0	2	2	0	50	50
Total Credits/Marks						**22**			**700**

**end of 3-2 start of internship to be evaluated during summer vacation*

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

VII – SEMESTER

S.NO	Category	SUBJECT	L	T	P	C	INT	EXT	TOT
1	PC	Water Resources Engineering	3	1	0	3	30	70	100
2	PE	PE-IV (Remote Sensing and GIS)	3	1	0	3	30	70	100
3	PE	PE-V	3	1	0	3	30	70	100
4	OE	OE-III	3	1	0	3	30	70	100
5	HS	Professional Ethics & Human Values	3	1	0	3	30	70	100
6		Ground Improvement Techniques	3	1	0	3	15	35	50
7		Remote Sensing and GIS Lab(SAC)	0	0	3	2	15	35	50
8	TI	Industrial / Research Internship 2	0	0		3		50	50
9	PC	Advanced surverying	1	0	2	1.5		50	50
Total Credits/Marks						**24.5**		**650**	
11		**Honors/ Minor courses** (The hours distribution can be 3-0-2 or 3-1-0)	3	1	0	4	30	70	100

VIII – SEMESTER

S.NO	Category	SUBJECT	L	T	P	C	INT	EXT	TOT
1	PW	Project	0	0	0	8	60	140	200
Total Credits/Marks						**8**			**200**

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

PROFESSIONAL ELECTIVE COURSES

S.NO	Professional Elective - I	Professional Elective - II	Professional Elective - III	Professional Elective - IV	Professional Elective - V
1	Industrial Waste Water Management	Environmental Impact Assessment	Air Pollution and Control	Solid and Hazardous Waste Management	Pre- stressed Concrete
2	Water shed Management	Geo Spatial Technologies	Disaster Management	Traffic Engineering	Construction Technology & Management
3	Green Buildings	Road safety Engineering	Advanced Foundation Engineering	Estimation Specifications and Contracts	Advanced Concrete Technology

HONORS R22

(Starts from II-II)

(4x4+2 MOOCS/NPTELx2=20 Credits) for Civil Engineering Students
Note: Student must choose subjects which were not opted earlier (Any FOUR courses may be chosen by the Student from each Pool)

Transportation Engineering	Structural Engineering	Environmental Engineering	Geotechnical Engineering	Construction Technology and Management
Traffic Engineering	Finite Element Methods	Urban Hydrology	Reinforced Soil Structures	Construction Technology and Management
Intelligent Transportation System	Matrix Analysis of Structures	Water and Wastewater Management	Advanced Foundation Engineering	Repairs and Maintenance of Structures
Railway, Harbor and Airport Engineering	Earthquake Resistant Design	Water Resources Planning and Management	Earth Retaining Structures	Architecture & Town Planning
Pavement Management System	Pre-stressed concrete	Environmental Impact Assessment	Geo-environmental Engineering	Disaster Management and Mitigation
Urban Transportation Planning	Repair & Retro-fitting of Buildings	Air Pollution and Control	Earth & Rock Fill Dams	Precast and Prefabricated Structures

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

OPEN ELECTIVES R22

(4 OE x 3 = 12 Credits)

Note: Student must choose subjects which were not opted earlier.

OPEN Electives (OE Starts from III-I)

OPEN ELECTIVE-1	OPEN ELECTIVE-2	OPEN ELECTIVE-3	OPEN ELECTIVE-4
Strength of Materials	Fluid Mechanics	Highway Engineering	Water Resource Engineering
Elements of Civil Engineering	Environmental Engineering	Safety Engineering	Hydraulics and Hydraulic Machinery
Surveying and Geometrics	Disaster Management	Environmental Management	Green Technologies
		Urban Planning	Remote Sensing & GIS

MINOR R22 (Start from II-II)

1. The student can opt any 4 subjects from each pool.
2. Compulsory MOOC/NPTEL Courses for 04 credits (02 courses@ 2 credits each)

Minor-1(II Year II Sem)	***Minor-2 (III Year I Sem)***	***Minor-3(III Year II Sem)***	***Minor-4 (IV Year I Sem)***
Construction Technology and Infrastructure Management	*Seismology and Earthquake Engineering*		*Irrigation Engineering*
Environmental Engineering and Management	*Solid Mechanics*	*Architecture and Smart City*	*Geoinformatics*
Minor-1(II Year II Sem)	**Minor-2 (III Year I Sem)**	**Minor-3(III Year II Sem)**	**Minor-4 (IV Year I Sem)**
Advanced Design of Steel Structures	Ground Improvement Techniques	Design of Hydraulics Structures	Advanced Highway Engineering
Bridge Engineering	Advanced Foundation Engineering	Advanced Water Resources Engineering	Traffic Engineering
Earthquake Resistant Design	Geotechnical Earthquake Engineering	Environmental impact assessment	Advanced Pavement Design Engineering
Prestressed Concrete	Design of Earth Retaining Structures	Solid waste management and landfills	Urban Transport Systems Planning
Prefabricated Structure	Geo synthetics and reinforced soil structure	Advanced Environmental Engineering	Railways, Docks, Harbors and airports

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

I Year - I Semester		L	T	P	C
		3	0	0	3
Building Materials and Construction					

Objectives of the Course:

- Initiating the student with the knowledge of basic building materials and their properties.
- Imparting the knowledge of course pattern in masonry construction and flat roofs andtechniques of forming foundation, columns, beams, walls, sloped and flat roofs.
- The student is to be exposed to the various patterns of floors, walls, different types ofpaints and varnishes.
- Imparting the students with the techniques of formwork and scaffolding.
- The students should be exposed to classification of aggregates, moisture content of the aggregate.

Course Outcomes:

Upon the successful completion of the course:

- The student should be able to identify different building materials and their importance inbuilding construction.
- The student is expected to differentiate brick masonry, stone masonry construction anduse of lime and cement in various constructions.
- The student should have learnt the importance of building components and finishings.

The student is expected to know the classification of aggregates, sieve analysis andmoisture content usually required in building construction

UNIT I: Stones, Bricks and Tiles: Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile - manufacturing methods, types of tiles. Uses of materials like Aluminium, Gypsum, Glass and Bituminous materials

UNIT II Masonry: Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls. Wood: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiber Reinforced Plastics, Steel, Aluminium.

UNIT III: Lime and Cement: Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime.
Cement: Portland cement- Chemical Composition – Hydration, setting and fineness ofcement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance – various tests for concrete.

UNIT IV: Building Components: Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, MadrasTerrace and Pre fabricated roofs.

UNITV: Finishings and Aggregates: Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering. Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings.

Aggregates - Classification of aggregate – Coarse and fine aggregates- particle shape andtexture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity andabsorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.

Text Books:

1. Building Materials, S. S. Bhavikatti, Vices publications House privateltd.
2. Building Construction, S. S. Bhavikatti, Vices publications House privateltd.
3. Building Materials, B. C. Punmia, Laxmi Publications privateltd.
4.Building Construction, B.C. Punmia, Laxmi Publications (p)ltd.

References:

1. Building Materials, S. K. Duggal, New Age International Publications.
2. Building Materials, P. C. Verghese, PHI learning (P)ltd.
3. 3.Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4.Building construction, P. C. Verghese, PHI Learning (P)Ltd.

5.Building Materials, Construction and Planning,S.Mahaboob Basha, Anuradha Publications,Chennai.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

I Year - II Semester	ENGINEERING GEOLOGY	L	T	P	C
		3	0	0	3

Course LearningObjectives:

The objective of this courseis:

- To introduce the course: Engineering Geology to the Civil Engineering graduates.
- To enable the students, understand what minerals and rocks are and their formation andidentification.
- To highlight significance/ importance/ role of Engineering Geology in construction of CivilEngineering structures.
- To enable the student, realise its importance and applications of Engineering Geology in CivilEngineering constructions.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Identify and classify the geological minerals
- Measure the rock strengths of various rocks
- Classify and measure the earthquake prone areas to practice the hazard zonation
- Classify, monitor and measure the Landslides and subsidence
- Prepares, analyses and interpret the Engineering Geologic maps
- Analyses the ground conditions through geophysical surveys.
- Test the geological material and ground to check the suitability of civil engineering projectconstruction.
- Investigate the project site for mega/mini civil engineering projects. Site selection for megaengineering projects like Dams, Tunnels, disposal sites etc.

UNIT-I:

Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies.
Weathering: Weathering of rocks, Geological agents, weathering process of Rock, Rivers and geological work of rivers.

UNIT-II

Mineralogy and Petrology: Definitions of mineral and rock-Different methods of study of mineral and rock. Physical properties of minerals and rocks for megascopic study for the following minerals and rocks. Common rock forming minerals: Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

UNIT-III

Structural Geology: Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

UNIT-IV

Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Earthquakes and Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

UNIT-V

Geology of Dams, Reservoirs and Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Geology consideration for successful constructions of reservoirs, Life of Reservoirs. Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

TEXT BOOKS:

1. 'Engineering Geology' by Subinoy Gangopadhay, Oxford University press.
2. 'Engineering Geology' by D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.
3. 'Engineering Geology' by N. Chenn kesavulu, Trinity Press (Laxmi Publications), 2nd Edition, 2014.
4. 'Engineering Geology' by Vasudev Kanithi, University Press.

REFERENCES:

1. 'Engineering Geology for Civil Engineers' by P.C. Varghese, PHI learning pvt. Ltd.
2. 'Geology for Engineers and Environmental Society' by Alan E Kehew, person publications,3rd edition
3. 'Fundamentals of Engineering Geology' by P.G.Bell, B.S.P. Publications, 2012.
4. 'Engineering Geology' by V.Parthesarathi et al., Wiley Publications
5. 'Environmental Geology' by K.S.Valdiya, McGraw Hill Publications, 2nd ed.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

I Year – II Semester	Engineering Geology Lab	L	T	P	C
		0	0	2	1

Course LearningObjectives:

The objective of this courseis:

- To identify the Megascopic types of Ore minerals & Rock forming minerals.
- To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks.
- To identify the topography of the site & material selection.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Identify Megascopic minerals & their properties.
- Identify Megascopic rocks & their properties.
- Identify the site parameters such as contour, slope & aspect for topography.
- Know the occurrence of materials using the strike & dip problems.

SYLLABUS:

LIST OF EXPERIMENTS

1. Physical properties of minerals: Mega-scopic identification of
   a. Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…
   b. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…
2. Megascopic description and identification of rocks.
   a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery,Basalt, etc.
   b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite,Conglamorate, etc.
   c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble,Khondalite, etc.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults,unconformities etc.
4. Simple Structural Geology problems.
5. Bore hole data.
6. Strength of the rock using laboratory tests.
7. Field work – To identify Minerals, Rocks, Geomorphology & Structural Geology.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

LAB EXAMINATION PATTERN:

1. Description and identification of FOUR minerals
2. Description and identification of FOUR (including igneous, sedimentary and metamorphicrocks)
3. ONE Question on Interpretation of a Geological map along with a geological section.
4. TWO Questions on Simple strike and Dip problems.
5. Bore hole problems.
6. Project report on geology.

REFERENCES:

1. 'Applied Engineering Geology Practicals' by M T Mauthesha Reddy, New Age InternationalPublishers, 2nd Edition.
2. 'Foundations of Engineering Geology' by Tony Waltham, Spon Press, 3rd edition, 2009.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year - I Semester	Surveying -I	L	T	P	C
		3	0	0	3

UNIT – I, Introduction: definition-Uses of surveying- overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications – Errors in survey measurements

UNIT – II, Chain Surveying Equipment used and their functions, Chains and arrows. Metallic tapes and Steel tapes, ranging rods, offset rods, pegs, plumb bob, Optical square, Line ranger, Different operations in Chain Surveying-Direct ranging and Indirect ranging ,Chaining on Flat ground, Chaining on sloping ground and chaining when high ground intervenes., Setting out right angles with or with out cross staff, Principles of Chain triangulation. Types of stations and types of chain lines, Recording field notes – field book-Conventional signs, Errors in chain survey, Correction due to incorrect length of Chain – problems, Obstacles in chain survey -methods to overcome obstacles – problems.

UNIT – III, Compass Surveying Purpose and principle of compass Survey, Parts of prismatic compass – identification and their function, Meridians - true meridian, magnetic meridian, arbitrary Meridian - Bearingswhole Circle bearing, Quadrant bearing -. Dip, Declination and local attraction, conversion of whole circle bearing to Quadrantal bearing and vice versa, Local attraction- and its effects, Detection of local attraction and computation of corrected bearings – problems, Determination of included angles and true bearings of lines in a Compass Closed traverse from data – declination – Problems, Operations involved in field in Compass Survey – Types of compass surveys, Method of recording field notes, Plotting of Closed traverse-closing error and adjustments by Bowditch method, Errors in Compass Surveying-Personal, Instrumental and Natural

UNIT – IV, Definition of leveling, Types of levelling instruments, Definitions :Datum or Datum plane, Reduced level, Level surface, Horizontal surface,. Vertical Line . Station. Mean sea level, and. Bench Mark, Component parts of a Dumpy level and their functions sketch of dumpy level, Temporary adjustments of a Dumpy level – setting , levelling and elimination of parallex, Steps involved in performing Temporary adjustments of a dumpy level, Back sight, Fore sight, Intermediate sight and Change Point, Tabulation of levelling field data, methods of reducing levels, height of instrument and Rise and fall methods, Computation of reduced levels by height of instrument and Rise and fall methods, and apply check, Errors in leveling, Errors due to 1. Curvature and 2. Refraction 3. Combined error – corrections, Reciprocal levelling , Derivation of the formula for true difference in elevation and true error between two points in reciprocal leveling, Calculation of true difference in elevation and collimation error in reciprocal leveling.

UNIT – V, Contouring- Characteristics and uses of Contours, methods of contour surveying.
Areas - Determination of areas consisting of irregular boundary and regular boundary.
Volumes -Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits, capacity of reservoirs.

TEXT BOOKS:

1. Surveying (Vol – 1, 2), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
2. Chandra A M, "Plane Surveying and higher surveying", New Age International Pvt. Ltd., Publishers, New Delhi.
3. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

REFERENCES:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
2. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
3. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year - I Semester	Strength of Materials - I	L	T	P	C
		3	0	0	3

Course Learning Objectives:

- To impart preliminary concepts of Strength of Material and Principles of Elasticity and Plasticity Stress conditions and to develop diagrams of variation of various stresses across the length.
- To give concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections
- The concepts above will be utilized in measuring deflections in beams under various loading and support conditions
- To classify cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure.

Course Outcomes:

- The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions
- The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
- The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions
- The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lame's equation.

UNIT – I:

Simple Stresses And Strains : Elasticity and plasticity – Types of stresses and strains

– Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – stresses in composite bars – Temperature stresses.
Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT – II: Shear Force and Bending Moment: Definition of beam – Types of beams – Concept of shear force and bending moment – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam; S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.

UNIT – III: Flexural and shear Stresses in beams

Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R, Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections.

Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, I, T Angle sections.

UNIT – IV: Deflection of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic curve of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads,

couple and combination of these loads. Mohr's theorems – Moment area method – application to simple cases of cantilever

UNIT – V: Thin and Thick Cylinders:

Thin cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders.

Thick cylinders: Introduction: Lames theory for thick cylinders, Derivation of Lames formulae, distribution of hoop and radial stresses across the thickness, compound cylinders-distribution of stresses.

TEXT BOOKS:

1. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, NewDelhi
2. Strength of materials by R. K. Bansal, Lakshmi Publications.

REFERENCES:

1.Mechanics of Materials- by R. C.Hibbler, Pearson publishers
2.Mechanics of Solids – E P Popov, Prentice Hall.
3.Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition,Universities Press
4.Mechanics of Structures Vol – I by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year - I Semester	Fluid Mechanics	L	T	P	C
		3	0	0	3

Course Learning Objectives:

- To understand the properties of fluids and fluid statics
- To derive the equation of conservation of mass and its application
- To solve kinematic problems such as finding particle paths and streamlines
- To use important concepts of continuity equation, Bernoulli's equation andturbulence, and apply the same to problems
- To analyze laminar and turbulent flows
- To understand the various flow measuring devices
- To study in detail about boundary layers theory

Course Outcomes:

Upon successful completion of this course the students will be able to:

- Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics.
- Calculate the forces that act on submerged planes and curves.
- Ability to analyse various types of fluid flows.
- Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.
- Able Measure the quantities of fluid flowing in pipes, tanks and channels.

UNIT I

Introduction: Dimensions and units – Physical properties of fluids - specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law -atmospheric, gauge and vacuum pressures- measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers.

Hydrostatics: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure.

UNIT – II

Fluid Kinematics: Description of fluid flow, Stream line, path line and streak line and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, flow net analysis.

Fluid Dynamics: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line - Momentum equation and its application – forces on pipe bend.

UNIT – III

Laminar Flow and Turbulent Flows: Reynold's experiment – Characteristics of Laminar & Turbulent flows, Shear and velocity distributions, Laws of Fluid friction, Hagen-Poiseulle Formula, Flow between parallel plates, Flow through long tubes, hydro-dynamically smooth and rough flows.

Closed Conduit Flow: Darcy-Weisbach equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynold's number – Moody's Chart, Pipe network problems, Hazen-Williams formula, Hard-Cross Method,

UNIT – IV

Measurement of Flow: Pitot tube, Venturi meter and Orifice meter – classification of orifices, small orifice and large orifice, flow over rectangular, triangular, trapezoidal and Stepped notches, Broad crested weirs and Ogee weirs.

UNIT – V

Boundary Layer Theory: Boundary layer (BL) – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarman momentum integral equation, laminar and turbulent Boundary layers (no deviations)- BL in transition, separation of BL, Control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

Text Books:

1. Modi P.N and Seth S.M.(2018), "Fluid mechanics", Standard book house, New Delhi
2. AtextofFluidmechanicsandhydraulicmachines,R.K.Bansal-LaxmiPublications (P) ltd., New Delhi

References:

1.K.Subramanyam, Fluid mechanics and hydraulic machines Mc graw hill education, IInd edition
2. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli, Oxford Higher Education.
3. Principle of fluid mechanics and fluid machines III edition, university press

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year - I Semester	Concrete Technology	L	T	P	C
		3	0	0	3

Course Learning Objectives:

- To learn concepts of Concrete production and behaviour in various environments.
- To learn test procedures for determination of properties of concrete.
- To understand durability properties of concrete in various environments.

Course Outcomes:

Upon successful completion of this course, student will be able to

- understand basic concepts of concrete.
- realize importance of quality of concrete.
- familiarize basic ingredients of concrete and their role in concrete and their behaviour inthe field.
- test fresh concrete properties and hardened concrete properties.
- evaluate ingredients of concrete through lab tests. design concrete mix by IS method.
- familiarize basic concepts of special concrete and their production and applications. understand the behaviour of concrete in various environments.

UNIT I : Ingredients of Concrete :

Portland cement – Chemical composition – Hydration, Setting times, Fineness, Structure – Tests on cement for physical properties – Grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silicafume.

Aggregates: Classification – Particle shape & texture – Bond, strength & other mechanical properties – Specific gravity, Bulk density, porosity, adsorption & moisture content – Bulking of sand –Deleterious substance – Soundness – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size. Quality of mixing water.

UNIT – II : Mix Design and Fresh Concrete

Mix Design: Factors affecting mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Concepts Proportioningof concrete mixes by IS method.

Fresh Concrete: Production of Concrete–mix proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete - Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete, Ready mixed concrete, Shotcrete

UNIT – III : Hardened Concrete: Water - Cement ratio – Abram's Law – Gel space ratio –strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete:

Compression tests – Tension tests – Factors affecting strength – Flexure tests –Splitting tests – Non-destructive testing methods – code provisions for NDT.

UNIT – IV : Elasticity, Creep & Shrinkage, Modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio, Creep of concrete and factors influencing creep, Relation between creep & time, Nature of creep, Effects of creep – Shrinkage –types of shrinkage.

UNIT – V : Special Concretes: Ready mixed concrete, Shotcrete, Light weight aggregate concrete, Cellular concrete, No-fines concrete, High density concrete, Fibre reinforced concrete, Different types of fibres, Factors affecting properties of FRC, Polymer concrete, Types of Polymer concrete,Properties of polymer concrete, High performance concrete–Self compacting concrete, SIFCON, self healing concrete.

Text Books:

1. Concrete Technology, M. S. Shetty. – S. Chand & Company
2. Concrete Technology, A. R. Santhakumar, Oxford University Press, NewDelhi

References :

1. Properties of Concrete, A. M. Neville – Pearson – 5thedition
2. Concrete, Microstructure, Properties and Materials by P.K.Mehta and Moterio,McGraw Hill
3. Concrete Technology, M.L. Gambhir. – Tata Mc. Graw Hill Publishers, NewDelhi

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year – I Semester	Surveying Field Work - I	L	T	P	C
		0	0	2	1.5

List of Field Works:

1. Survey by chain survey of road profile with offsets in case of road widening.
2. Survey in an area by chain survey (Closed circuit)
3. Determination of distance between two inaccessible points by using compass.
4. Finding the area of the given boundary using compass (Closed Traverse)
5. Plane table survey; finding the area of a given boundary by the method of Radiation
6. Plane table survey; finding the area of a given boundary by the method of intersection.
7. Two Point Problem by the plane table survey.
8. Fly levelling : Height of the instrument method (differential levelling)
9. Fly levelling: rise and fall method.
10. Fly levelling: closed circuit/ open circuit.
11. Fly levelling; Longitudinal Section and Cross sections of a given road profile.
12. Fly levelling and Fly chaining (complete field work).

Note: Any 10 field work assignments must be completed.

***

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year – I Semester	Strength of Materials Lab	L	T	P	C
		0	0	2	1.5

Experiments

1. Tension test on Mild steel bar
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test (Charpy and Izod impact test)
9. Shear test (on UTM)
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of Electrical resistance strain gauges
12. Continuous beam – deflection test.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year – I Semester	Concrete Technology Lab	L	T	P	C
		0	0	2	1.5

Course Learning Objectives:

- To study basic properties ingredients of concrete, fresh and hardened concrete properties

Course Outcomes:

Upon successful completion of this course, student will be able to

- Determine consistency and fineness of cement.
- Determine setting times of cement.
- Determine specific gravity and soundness of cement.
- Determine compressive strength of cement.
- Determine workability of cement concrete by compaction factor, slump and Vee – Beetests
- Determine specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
- Determine flakiness and elongation index of aggregates.
- Determine bulking of sand.
- Understand non-destructive testing procedures on concrete.

List of Experiments: At least 10 experiments must be conducted (at least one for each property)

1. Determination of normal Consistency and fineness of cement.
2. Determination of initial setting time and final setting time of cement.
3. Determination of specific gravity and soundness of cement.
4. Determination of compressive strength of cement.
5. Determination of grading and fineness modulus of Coarse aggregate by sieve analysis.
6. Determination of specific gravity of coarse aggregate
7. Determination of grading and fineness modulus of fine aggregate (sand) by sieve analysis.
8. Determination of bulking of sand.
9. Determination of workability of concrete by compaction factor method.
10. Determination of workability of concrete by slump test
11. Determination of workability of concrete by Vee-beetest.
12. Determination of compressive strength of cement concrete and its young's modulus
13. Determination of split tensile strength of concrete.
14. Non-Destructive testing on concrete (for demonstration)

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year - I Semester	**SKILL ORIENTED COURSE***	**L**	**T**	**P**	**C**
		1	**0**	**2**	**2**

Topographic Survey with contour map (Total station/ DGPS) or

Masonry 3' height with different bonds and different thickness

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year - II Semester	Surveying - II	L	T	P	C
		3	0	0	3

UNIT – I, Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Introduction to Omitted measurements.

UNIT – II, Trigonometric leveling, Principle and necessity of Trigonometric levelling , Elevations and Distance of objects whose base is accessible and base is inaccessible with instruments station in same vertical plane and different vertical plane

Tachometric Surveying: Principles of Tachometry, stadia and tangential methods of Tachometry Types and advantages of tacheometry-Stadia Tacheometry with staff held vertical and line of collimation horizontal or inclined – finding elevations and distances of staff stations – problems – determination of Tacheometric constants

UNIT – III,Curves Types of curves and their necessity, elements of simple, compound, reverse curves Simple circular curve- definition and notations used, Preparation of curve table and setting out curves by chain and tape - single and double Theodolite methods – problems.

Modern Surveying Methods: Principle and types of E.D.M. Instruments - advantages and Applications.

UNIT – IV, Total station- advantages and Applications. Introduction to Global Positioning System Parts and functions – setting up total station for taking observations - Use of Total Station - Measurement of distances and angles - multiple number of observations on a single station - measurement of area with single station setup – Traversing using a total station - orientation of total station by resection method – establishing TBM by station elevation method – staking out a point, line and an arc – marking the centre line for a typical residential building - LS and CS for proposed road / canal / pipe line

UNIT - V Photogrammetry Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereoplotting instruments, mosaics, map substitutes.

TEXT BOOKS:

1. Surveying (Vol – 1, 2), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
2. Chandra A M, "Plane Surveying and highersurveying", New Age International Pvt. Ltd., Publishers, New Delhi.
3. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

REFERENCES:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
2. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
3. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year - II Semester	Strength of Materials - II	L	T	P	C
		3	0	0	3

Course Learning Objectives:

- To give concepts of Principal stresses and strains developed in cross section of the beams on the cross section and stresses on any inclined plane. To impart concepts of failures in the material considering different theories
- To give concepts of torsion and governing torsion equation, and there by calculate the power transmitted by shafts and springs and design the cross section when subjected to loading using different theories of failures.
- To classify columns and calculation of load carrying capacity and to assess stresses due to axial and lateral loads for different edge conditions and to calculate combined effect of direct and bending stresses on different engineering structures.
- Introduce the concept of unsymmetrical bending in beams Location of neutral axis Deflection of beams under unsymmetrical bending.

Course Outcomes:

Upon successful completion of this course,

- The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
- The student can assess stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions

UNIT- I Principal Stresses and Strains And Theories of Failures: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.
Theories of Failures: Introduction – Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT – II Torsion of Circular Shafts and Springs: Theory of pure torsion – Derivation of Torsion equations: $T/J = q/r = N\phi/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.
Springs: Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel.

UNIT – III Columns and Struts: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions- derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.

UNIT – IV Direct and Bending Stresses: Stresses under the combined action of direct loading and B.M. Core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axis.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

UNIT – V Unsymmetrical Bending and Shear Centre

Un-symmetrical Bending: Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes
– Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis Deflection of beams under unsymmetrical bending.

Shear Centre: Introduction Shear center for symmetrical and unsymmetrical sections (channel, I, T and L sections).

TEXT BOOKS:

1. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, NewDelhi
2. Strength of materials by R. K. Bansal, Lakshmi Publications.

REFERENCES:

1. Mechanics of Materials- by R. C.Hibbler, Pearson publishers
2. Mechanics of Solids – E P Popov, Prentice Hall.
3. Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition, Universities Press,
4. Mechanics of Structures Vol – I by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year - II Semester	Hydraulics Hydraulic Machinery	L	T	P	C
		3	0	0	3

Course Learning Objectives:

- To study about uniform and non-uniform flows in open channel and also to learn about the characteristics of hydraulic jump
- To introduce dimensional analysis for fluid flow problems
- To understand the working principles of various types of hydraulic machines and Pumps.

Course Outcomes:

Upon successful completion of this course the students will be able to:

- Solve uniform and non-uniform open channel flow problems.
- Apply the principals of dimensional analysis and similitude in hydraulic model testing.
- Understand the working principles of various hydraulic machineries and pumps.

UNIT – I: UNIFORM FLOW IN OPEN CHANNEL:

Types of channels –Types of flows - Velocity distribution – Energy and momentum correction factors – Chezy's, and Manning's formulae for uniform flow – Most Economical sections, Critical flow: Specific energy-critical depth – computation of critical depth

UNIT II: NON-UNIFORM FLOW IN OPEN CHANNELS: Steady Gradually Varied flow- Dynamic equation, Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT – III: HYDRAULIC SIMILITUDE: Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

UNIT – IV: BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle.

UNIT – V:

HYDRAULIC TURBINES – I: Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines. Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and efficiency. Governing of turbines-surge tanks-unit and specific quantities, selection of turbines, performance characteristics-geometric similarity-cavitation.

PUMPS:

CENTRAIFUGAL-PUMPS: Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies-specific speed, multistage pumps-pumps in parallel and series - performance of pumps-characteristic curves- NPSH- Cavitation.

RECIPROCATING PUMPS: Introduction, classification, components, working, discharge, indicator diagram, work done and slip

Text Books:

1. Open Channel flow, K. Subramanya, Tata McGraw Hill Publishers
2. Fluid mechanics and hydraulic machines, Rajput, A.K(2018) , S chand ,New Delhi
3. Fluid Mechanics, Modi and Seth, Standard book house.

References:

1. Fluid Flow in Pipes and Channels, G.L. Asawa, CBS
2. Fluid Mechanics and Machinery, C.S.P. OJHA, R. BERNDTSSON and P.N. Chandramouli, Oxford Higher Education.
3. Fluid Mechanics and Machinery, Md. Kaleem Khan, Oxford Higherducation.

Fluid mechanics and Hydraulic machines, R.K. Bansal, Laxmi publications ,New Delhi

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year - II Semester	Building Planning & Drawing	L	T	P	C
		3	0	0	3

UNIT. I: BUILDING BYELAWS AND REGULATIONS Introduction- terminology- objectives of building byelaws- floor area ratiofloor space index- principles under laying building bye laws- classification of buildings- open space requirements – built up area limitations- height of buildings- wall thickness – lightening and ventilation requirements.

UNIT. II: RESIDENTIAL BUILDINGS Minimum standards for various parts of buildings- requirements of different rooms and their grouping- characteristics of various types residential buildings.

UNIT. III: PUBLIC BUILDINGS Planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels & motels, buildings for recreation.

UNIT.IV : SIGN CONVENTIONS AND BONDS Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles. English bond and Flemish bond- odd and even courses for one, one-half, two and two & half brick walls in thickness at the junction of a corner.

UNIT.V: DOORS, WINDOWS, VENTILATORS AND ROOFS Panelled door, panelled and glassed door, glassed windows, panelled windows, swing ventilators, fixed ventilators, coupled roof, collar roofs. King Post truss, Queen Post truss Sloped and flat roof buildings : drawing plans, Elevations and Cross Sections of given sloped roof buildings.

PLANNING AND DESIGNING OF BUILDINGS Draw the Plan, Elevation and sections of a Residential & Public buildings from the given line diagram.

TEXT BOOKS: 1. Planning and Design of buildings by Y.S. Sane

2. Planning, designing and Scheduling by Gurucharan Singh and Jagadish Singh

3. Building planning and drawing by M. Chakravarthi.

4. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur,

REFERENCES: 1. Building drawing by Shah and Kale

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year - II Semester	Environmental Engineering	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The course will address the following:

- Outline planning and the design of water supply systems for a community/town/cityand selection of source based on quality and quantity
- Design of water treatment plant for a village/city
- Impart knowledge on design of water distribution network
- Design of sewers and plumbing system for buildings
- Design of Sewage Treatment Plant

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Select a source based on quality and quantity and Estimate design population and water demand
- Design a water treatment plant for a village/city
- Design a sewer by estimating DWF and Strom water flow and plumbing system for buildings
- Design a Sewage Treatment Plant for a town/city.

UNIT–I

Introduction: Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer.

Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - factors affecting water demand, Design Period, Population forecasting.

Sources of Water: Lakes, Rivers, Comparison of sources with reference to quality, quantity and other considerations- Ground water sources: springs, Wells and Infiltration galleries, Characteristics of water– Physical, Chemical and Biological characteristics and WHO guidelines for drinking water
- IS 10500 2012 - Water quality standards for Agriculture, Industries and Construction.

UNIT–II

Treatment of Water: Treatment methods: Theory and Design of Sedimentation, Coagulation, Filtration.
Disinfection: Theory of disinfection-Chlorination and other Disinfection methods.
Removal of color and odors- Removal of Iron and Manganese - Adsorption- Fluoridation and deflouridation–Reverse Osmosis- Solar stills- Freezing

UNIT–III

Collection and Conveyance of Water: Factors governing the selection of the intake structure, Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, Design of economical diameter of pumping main, HP of pump and monthly expenditure for an apartment and a village. Laying and testing of pipe lines- Capacity of storage reservoirs, Mass curve analysis.

Distribution of Water: Methods of Distribution system, Layouts of Distribution networks, Water main appurtenances - Sluice valves, Pressure relief valves, air valves, check valves, hydrants, and water meters–Ideal water supply system. Case studies.

UNIT – IV

Sewerage: Estimation of sewage flow and storm water drainage – fluctuations – types of sewers - design of sewers.

Sewer appurtenances – cleaning and ventilation of sewers. **Sewage pumps.**

House Plumbing: Systems of plumbing-sanitary fittings and other accessories– one pipe and two pipe systems – Design of drainage in Gated communities, Apartments and Hotels.
Septic Tank - working Principles and Design

UNIT – V

Sewage characteristics –Characteristics of sewage - BOD equations. ThOD, COD and BOD.

Treatment of Sewage: Primary treatment. **Secondary treatment**: Activated Sludge Process, principles, designs, and operational problems. Oxidation ponds, Trickling Filters – classification – design, operation and maintenance problems. RBCs. Fluidized bed reactors –Anaerobic digestion of sludge, Sludge Drying Beds.

Ultimate Disposal of sewage: Methods of disposal – disposal into water bodies-Oxygen Sag Curve-Disposal into sea, disposal on land, Crown corrosion, Sewage sickness. Effluent standards.

Text Books

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985.
2. Rural Municipal and Industrial water management, KVSG Murali Karishna, Environmental Protection Society, Kakinada, 2021.
3. Industrial Water and Wastewater Management, K.V.S.G. Murali Krishna, Paramount Publications, Visakhapatnam, 2018.
4. Elements of Environmental Engineering – K. N. Duggal, S. Chand & Company Ltd., New Delhi, 2012.

References

1. Water Supply Engineering – P. N. Modi.
2. Water Supply Engineering – B. C. Punmia
3. Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie
4. Environmental Engineering, D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.
5. Environmental Engineering, Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier,2003
6. Environmental Engineering, D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year – II Semester	Surveying Field Work - II	L	T	P	C
		0	0	2	1.5

List of Experiments

1. Theodolite Survey: Determining the Horizontal and Vertical Angles by the method of repetition method.

2. Theodolite Survey: Finding the distance between two inaccessible points.

3. Theodolite Survey: Finding the height of far object.

4. Tacheomatric Survey: Heights and distance problems using tacheo matric principles.

5. One Exercise on Curve setting.

6. One Exercise on contours.

7. Total Station: Introduction to total station and practicing setting up, levelling up and elimination of parallax error.

8. Total Station: Determination of area using total station.

9. Total Station: Traversing

10. Total Station: Contouring

11. Total Station: Determination of Remote height.

12. Total Station: distance between two inaccessible points.

Note: Any 10 field work assignments must be completed

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year – II Semester	Fluid Mechanics And Hydraulic Machinery Lab	L	T	P	C
		0	0	2	1.5

List of Experiments

1. Calibration of Venturi meter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice and mouth piece by a constant head and variable head method.
3. Calibration of contracted Rectangular Notch and /or Triangular Notch
4. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
5. Verification of Bernoulli's equation.
6. Impact of jet on vanes
7. Study of Hydraulic jump.
8. Performance test on Pelton wheel turbine
9. Performance test on Francis turbine.
10. Efficiency test on centrifugal pump.
11. Efficiency test on reciprocating pump.

List of Equipment:

1. Venturi meter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouth piece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Hydraulic jump test setup.
10. Pelton wheel, Francis turbine and Kalpan turbines
11. Centrifugal and Reciprocating pumps.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year – II Semester	EVIRONMENTAL ENGINEERING LAB	L	T	P	C
		0	0	3	1.5

Course Learning Objectives:

The course will address the following:

- Estimation of important characteristics of water and wastewater in the laboratory
- Inference with reference to the significance of the characteristics of the water andwastewater

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Estimate some important characteristics of water, wastewater and soil in the laboratory
- Draw some conclusion and decide whether the water is suitable for Drinking/Construction/ Agriculture/ Industry.
- Estimate Chloride, EC and Salinity of Soiland suggest their suitability for Construction/Agriculture
- Estimation of the strength of the sewage in terms of BOD and COD and Decide whether the water body is polluted or not with reference to the stated parameters in the list of experiments
- Demonstration of various instruments used in testing of water and soil and study of Drinking water standards, WHO guidelines, Effluent standards and standards for Construction/ Agriculture/ Industry.

List of Experiments

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Determination and estimation of Total Hardness–Calcium &Magnesium in water.
3. Determination of P&M Alkalinity/Acidity
4. Determination of Chloride in water and soil
5. Determination and Estimation of total solids, organic solids and inorganic solids and Settleable Solids by Imhoff Cone.
6. Determination of Dissolved Oxygen with D.O. Meter &Wrinklers Method and BOD.
7. Physical parameters – Temperature, Color, Odor, Turbidity and Taste.
8. Determination of C.O.D.
9. Determination of Optimum coagulant dose- with and without coagulant aids
10. Determination of Chlorine residue and demand
11. Presumptive Coliform test.
12. Desalination by Freezing and Boiling.
13. EC, TDs and Chloride in RO System- Raw water, Product water and Reject.
14. Suitability of water for construction
15. Evaporation, Rainfall, Humidity, Wind speed, Wind Direction

NOTE: At-least 10 of the experiments enlisted are to be conducted. Values for different water and wastewater samples like Surface water, Ground water, Sea water, Municipal water, Bottled water, RO- Raw water, Product and Reject samples, Municipal sewage, Industrial waters etc

Text Books

1. Standard Methods for Analysis of Water and Waste Water –APHA
2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Environmental Protection Society, 4th Edition, 2021.

Reference

2. Relevant IS Codes.
3. Chemistry for Environmental Engineering by Sawyer and Mc.Carty.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

II Year - IISemester	**SKILL ORIENTED COURSE***	**L**	**T**	**P**	**C**
		1	**0**	**2**	**2**

Environmental Audit and compliance report or

Road safety audit with 1 or 2 KM length or

Water related leakage field studies

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year - I Semester	Structural Analysis	L	T	P	C
		3	0	0	3

Course Learning Objectives:

- To give preliminary concepts of assessment of bending moment and shear force in Propped cantilevers, fixed beams and continuous beams due to various loading conditions.
- To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions.
- The procedure for development of slope deflection equations and to solve application to continuous beams with and without settlement of supports.
- The concepts of moving loads and influence lines are imparted for assessment of maximum SF and BM at a given section when loads of varying spans rolling loads of Pratt and Warren trusses.

Course Outcomes:

Upon successful completion of this course the student will be able to,

- Distinguish between the determinate and indeterminate structures.
- Identify the behavior of structures due to the expected loads, including the moving loads, acting on the structure.
- Estimate the bending moment and shear forces in beams for different fixity conditions.
- Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems.
- Draw the influence line diagrams for various types of moving loads on beams/bridges.
- Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss.

UNIT – I Propped Cantilever and Fixed beams

Propped Cantilevers: Introduction -Degree of Static and Kinematic indeterminacy of Beams, frames and trusses. Analysis of propped cantilevers-shear force and bending moment diagrams- Elastic curve - Deflection of propped cantilever beams.

Fixed Beams – Introduction to statically indeterminate beams with U. D. load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - shear force and Bending moment diagrams-Elastic curve - Deflection of fixed beams including effect of sinking of support, effect of rotation of a support.

UNIT – II Analysis of Continuous beams and Portal Frames

Slope-Deflection Method: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports. Analysis of Single bay single storey portal frames without sway. Shear force and Bending moment diagrams, Elastic curve.

Moment distribution method: Application to continuous beams with and without settlement of supports. Analysis of Single bay single storey portal frames without sway. Shear force and Bending moment diagrams, Elastic curve.

UNIT III Analysis of Pin-Jointed Plane Frames: Determination of Forces in members of plane pin-jointed (determinate) perfect trusses by (i) method of joints (ii) method of sections and (iii) Method of Tension coefficients. Analysis of various types of cantilever and simply supported trusses by method of joints, method of sections and Tension coefficients.

UNIT – IV Moving Loads And Influence Lines: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load, U. D load longer than the span, U. D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length.
Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a sections, single point load, U.D. load longer than the span, U.D. load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

UNIT – V MATRIX METHODS OF ANALYSIS: Introduction to Flexibility and Stiffness matrix methods of analyses using 'system approach' up to three degree of indeterminacy– Analysis of continuous beams including settlement of supports using flexibility and stiffness methods - Analysis of pin-jointed determinate plane frames using flexibility and stiffness methods- Analysis of single bay single storey portal frames using only stiffness method - Shear force and bending moment diagrams - Elastic curve.

Text Books:

1. Structural Analysis by R.C. Hibbeler, Pearson, New Delhi.
2. Basic Structural Analysis, K U Muthu et. al., IK International Publishing house pvt. Ltd.

References

1. Indeterminate Structural Analysis, K U Muthu et. al., IK International Publishing house pvt. Ltd.
2. Analysis of Structures- Vol. I and II, V. N. Vazirani and M. M. Ratwani, Khanna
3. Publishers, New Delhi.
4. Mechanics of Structures Vol – II by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.
5. Structural Analysis by Devdas Menon, Narosa Publishing Housing Pvt. Ltd.
6. Structural Analysis: A Matrix Approach, G.S.Pandit and S.P.Gupta, Mc Graw Hill Pvt. Ltd.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year - I Semester	Geotechnical Engineering - I	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The Objectives of this course are:

1. To enable the student to determine the index properties of the soil and classify it.
2. To impart the concept of seepage of water through soils and determine the discharge of water through soils.
3. To impart the principles of compaction and consolidation of soils and determine the magnitude and the rate of consolidation settlement.
4. To enable the student to understand the concept of shear strength of soils, determine the shear parameters of sands and clays and the areas of their application.

Course Outcomes:

Upon the successful completion of this course

a. The student must know the definition of the various quantities related to soil mechanics and establish their inter-relationships.
b. The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
c. The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
d. The student should be able to apply the above concepts in day-to-day civil engineering practice.

UNIT – I

Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density

Index Properties of Soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

UNIT –II

Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability – Permeability of layered systems.

Geostatic Stresses: Total, neutral and effective stresses –quick sand condition Seepage: 2-D flow and Laplace's equation-Seepage through soils–Flow nets: Characteristics and Uses.

UNIT – III

Stress Distribution In Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark's influence chart – 2:1 stress distribution method.

UNIT – IV

Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.

Consolidation: Compressibility of soils –e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (c_v) - Over consolidated and normally consolidated clays.

UNIT – V

Shear Strength of Soils: Basic mechanism of shear strength -Mohr – Coulomb Failure theories – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions.

TEXT BOOKS:

1. Gopal Ranjan and A.S.R.Rao, "Basic and Applied Soil Mechanics", New Age International Publishers.
2. V.N.S.Murthy, "Soil Mechanics and Foundation Engineering", CBS publishers
3. M.Palani Kumar, "Soil Mechanics", PHI Learning

REFERENCES:

1. D.W.Taylor, "Fundamentals of Soil Mechanics", Wiley.
2. Holtz and Kovacs, "An introduction to Geotechnical Engineering" Prentice Hall
3. Donald P. Coduto, Man-chu Ronald Young and William A. Kitch.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year - I Semester		L	T	P	C
		3	0	0	3
Design and Drawing of Concrete Structures					

Course Learning Objectives:

The objective of this course is:

- Familiarize Students with different design philosophies
- Equip student with design of members in flexural and shear
- Understand bond and torsion
- Familiarize with design of compression members under different types of loading
- Understand different types of footings and design

Course Outcomes:

At the end of this course the student will be able to

- Work on different types of design methods
- Carryout analysis and design of flexural members and detailing
- Design structures subjected to shear, bond and torsion
- Design different type of compression members and footings

SYLLABUS:

UNIT –I Design Methods

Working stress method: Elastic theory: design constants, modular ratio, neutral axis depth and moment of resistance - balanced, under-reinforced and over-reinforced sections. Design of singly and doubly reinforced beams, IS Code Provisions.

Limit State Design: Basic statistical principles –Characteristic strength – Characteristic loads - Partial load and safety factors – stress-strain curves for HYSD bars and MS bars. Assumptions – stress block parameters – Moment of Resistance.

All units i.e. from unit II to unit V are to be taught in Limit State Design.

UNIT –II Design for Flexure and Shear: Design of singly reinforced beams- effective depth- Moment of Resistance- Doubly reinforced and flanged (T) beams- Minimum depth - Minimum and Maximum Flexural Tension Reinforcement - Design of Flanged Sections (T & L) - Effective width of flange - Analysis and Design Problems.

Design for Shear and Torsion: Analysis and design of sections for shear and torsion – bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.

UNIT – III Slabs and Serviceability: Classification of slabs, design of one - way slabs, one way continuous slab using IS Coefficients (Conventional) –Design of two - way slabs - simply supported slabs and slabs with various edge conditions using IS Coefficients. Design of Stair case **Limit state of serviceability:** Deflection, cracking and IS code provisions for beams and slabs.

UNIT – 1V Design of Compression members: Effective length, Braced and un-braced columns – IS Code provisions, Design of short and long columns under axial loads, uniaxial bending and biaxial bending (Demonstration using SP 16)

UNIT –V

Footings: Types of footings – Design of isolated footings – pedestal, square, rectangular and circular footings subjected to axial loads, uni-axial bending moment.

Text Books:

1. Limit State Design, A. K.Jain, Nem Chand Brothers
2. Reinforced Concrete Structures, N. Krishna Raju & R. N. Pranesh, and New Age Publications.
3. Structural Design and Drawing by N.Krishna Raju, Universities Press

References:

2. R C C Design, B.C Punmia, A. K. Jain and A. K Jain. Lakshmi Publications
3. Reinforced Concrete Structures, S. Unnikrishna Pillai &Devdas Menon, Tata C.Graw Hill, NewDelhi.
4. Design of Reinforced concrete Structures, N.Subrahmanian, and Oxford University Press.

Limit state design of reinforced concrete structures by P C Varghese, PHI Learning pvt. Ltd

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year - I Semester		L	T	P	C
		3	0	0	3

PC:1a) Industrial Waste Water Treatment

Course Learning Objectives:

The course will address the following:

1. Enables the student to distinguish between the quality of domestic and industrial waterrequirements and wastewater quantity generation.
2. To impart knowledge on selection of treatment methods for industrial wastewater.
3. To know the common methods of treatment in different industries
4. To acquire knowledge on operational problems of effluent treatment plant.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Know the quality and quantity of water for various industries and Advanced watertreatment methods
b. Learn the common methods of treatment of wastewaters and Biological treatmentmethods
c. Study of methods to reduce impacts of disposal of wasters into environment andCETPs.
d. Study of methods of treatment of wastewaters from specific industries like steelplants, refineries, and power plants, that imply biological treatment methods

Study of methods of treatment of wastewaters from industries like Aqua, dairy, sugarplants, and distilleries that imply biological treatment methods

UNIT – I

Industrial water Quantity and Quality requirements: Boiler, Cooling, Domestic/Canteen and Process waters for Textiles, Food processing, Dairy, Aqua industry, Sugar mills, Brewery and distillery Industries, Fertilizer industry, Power plants. Advanced water treatment - Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, elutriation, Removal of Iron and Manganese, Removal of Colour and Odour. Use of Municipal wastewater in Industries.

UNIT – II

Basic theories of Industrial Wastewater Management: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis - Wastewater characterization- Toxicity of industrial effluents- Common methods of Treatment of wastewaters - Unit operations and processes- Volume and Strength reduction – Neutralization – Equalization and proportioning- recycling, reuse and resources recovery. Miscellaneous Treatment: Biological treatment of sewage- Primary, secondary and Tertiary treatment of sewage.

UNIT – III

Industrial wastewater disposal management: Discharges into Sewers, Streams- Oxygen sag curve, Lakes-eutrophication and oceans and associated problems, Land treatment – sewage sickness, Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastewaters- Effluent Disposal Method.

UNIT – IV

Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants. Case studies.

UNIT – V

Process and Treatment of specific Industries-2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Aqua industry, Pharmaceutical Plants. Case studies.

Text books

1. Industrial Wastewater Treatment by KVSG Murali Krishna, Paramount Publishers, Visakhapatnam, 2019
2. Wastewater Treatment by M.N. Rao and A.K. Dutta, Oxford & IBH, NewDelhi.
3. Industrial Wastewater treatment by A.D. Patwardhan, PHI Learning,Delhi
4. Wastewater Treatment for Pollution Control and Reuse, by Soli. J Arceivala,Shyam R Asolekar, Mc-Graw Hill, New Delhi; 3rd Edition

References

1. Industrial Water Pollution Control by W. Wesley Eckenfelder, Mc- GrawHill, Third Edition
2. Wastewater Engineering by Metcalf and EddyInc, Tata McGrawhillCo., New Delhi
3. Wastewater Treatment- Concepts and Design Approach by G.L. Karia & R.A. Christian,Prentice Hall of India.
4. Unit Operations and Processes in Environmental Engineering by Reynolds. Richard, CengageLearning.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year - I Semester	**Professional Elective: 1b) Water shed Management**	L	T	P	C
		3	0	0	3

Course Learning Objectives

Introduce the concept of watershed management

- Understand the watershed characteristics
- Learn the principles of soil erosion and measures to control erosion
- Appreciate various water harvesting techniques.
- Learn land management practices for various land use/land cover.
- Introduce concepts of watershed modelling.

Course outcomes

At the end of the course the student will be able to

Calculate watershed parameters and analyse watershed characteristics to take appropriate management action.

- Quantify soil erosion and design control measures.
- Apply land grading techniques for proper land management .
- Suggest suitable harvesting techniques for better watershed management.
- Apply appropriate models for watershed management.

SYLLABUS

UNIT-I: Introduction: Concept of watershed development, objectives of watershed development, need for watershed development, Characteristics of Watersheds: Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio- economic characteristics.

UNIT-II : Principles of Erosion: Types and causes of erosion, factors affecting erosion, estimation of soil loss due to erosion- Universal soil loss equation. Measures to Control Erosion: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, check dams, rock-fill dams, brushwood dam, Gabion.

UNIT-III: Water Harvesting: Techniques of rain water harvesting- rain water harvesting from roof top, surface flow harvesting, subsurface flow harvesting, stop dams, farm ponds and dugout ponds, percolation tanks.

UNIT-IV: Land Management: Land use and Land capability classification, management of forest, agricultural, grassland and wild land, land grading operation, Reclamation of saline and alkaline soils.

UNIT-V: Watershed Modelling: Data of watershed for modelling, application and comparison of watershed models, model calibration and validation, advances of watershed models. Integrated and multidisciplinary approach for watershed management.

TEXT BOOKS

1. 'Watershed Management' by Das MM and M.D Saikia, PHI Learning Pvt. Ltd, 2013.
2. 'Land and Water Management' by Murthy.VVN, Kalyani Publications, 2007.
3. 'Watershed Management' by Murthy J V S, New Age International Publishers, 2006.

REFERENCES

1. 'Water Resource Engineering'by Wurbs R A and James R A, Prentice Hall Publishers, 2002.
2. 'Watershed Hydrology' by Black P E, Prentice Hall, 1996.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year - I Semester	Professional Elective: 1c) Green	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. To present different concepts of green technologies.
2. To acquire principles of Energy efficient technologies.
3. To impart knowledge on the methods of reducing CO2 levels in atmosphere.
4. To gain knowledge of the importance of life cycle assessment
5. To learn the importance of green fuels and its impact on environment.

Course Learning Outcomes

Upon successful completion of this course, the students will be able to:

- Enlist different concepts of green technologies in a project
- Understand the principles of Energy efficient technologies
- Estimate the carbon credits of various activities
- Identify the importance of life cycle assessment
- Recognize the benefits of green fuels with respect to sustainable development.

SYLLABUS:

UNIT- I

Introduction: Green Technology – definition- Importance – Historical evolution – advantages and disadvantages of green technologies-factors affecting green technologies- Role of Industry, Government and Institutions – Industrial Ecology – role of industrial ecology in green technology. Cleaner Production (CP): Definition – Importance – Historical evolution - Principles of Cleaner Production–Benefits–Promotion-Barriers – Role of Industry.

UNIT- II

Cleaner Production Project Development and Implementation:

Government and Institutions – clean development mechanism, reuse, recovery, recycle, raw material substitution-Wealth from waste, case studies.

Overview of CP Assessment Steps and Skills, Process Flow Diagram, Material Balance, CP Option Generation – Technical and Environmental Feasibility analysis – Economic valuation of alternatives - Total Cost Analysis – CP Financing – Preparing a Program Plan – Measuring Progress- ISO 14000.

UNIT- III

Pollution Prevention and Cleaner Production Awareness Plan – Waste audit – Environmental Statement, carbon credit, carbon sequestration, carbon trading, Life Cycle Assessment - Elements of LCA – Life Cycle Costing – Eco Labelling

UNIT -IV

Availability and need of conventional energy resources, major environmental problems related to the conventional energy resources, future possibilities of energy need and availability. Non-conventional energy sources: Solar Energy-solar energy conversion technologies and devices, their principles, working and application.

UNIT- V

Green Fuels – Definition-benefits and challenges – comparison of green fuels with conventional fossil fuels with reference to environmental, economic and social impacts- public policies and market-driven initiatives.

Biomass energy: Concept of biomass energy utilization, types of biomass energy, conversion processes, Wind Energy, energy conversion technologies, their principles, equipment and suitability in Indian context; tidal and geothermal energy.

TEXT BOOKS:

1. 'Pollution Prevention: Fundamentals and Practice' by Paul L Bishop (2000), McGraw Hill International.
2. 'Cleaner Production Audit' by Prasad Modak, C.Visvanathan and Mandar Parasnis (1995), Environmental System Reviews, No.38, Asian Institute of Technology, Bangkok
3. 'Non-conventional Energy Sources' by Rai G.D.

REFERENCES:

1. 'Pollution Prevention and Abatement Handbook – Towards Cleaner Production' by World Bank Group (1998), World Bank and UNEP, Washington D.C.
2. 'Handbook of Organic Waste Conversion' by Bewik M.W.M.
3. 'Energy, the Solar Hydrogen Alternative' by Bokris J.O.
4. 'Solar Energy' by Sukhatme S.P.

'Waste Energy Utilization Technology' by Kiang Y. H.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year – I Semester	Geotechnical Engineering Lab	L	T	P	C
		0	0	3	1.5

Learning Objectives:
The objective of this course is:

- To determine the index properties for soil classification – Grain size distribution &Atterberg's limits.
- To determine the engineering properties – Permeability, Compaction, consolidation, shear strength parameters& CBR value.
- To find the degree of swelling by DFS test.

1. To impart knowledge of determination of index properties required for classification of soils.
2. To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.
3. To teach how to determine shear parameters of soil through different laboratory tests.

Outcomes:
Upon successful completion of this course, student will be able to

a. Determine index properties of soil and classify them.
b. Determine permeability of soils.
c. Determine Compaction, Consolidation and shear strength characteristics.

SYLLABUS:

LIST OF EXPERIMENTS

1. Specific gravity, G
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Permeability of soil - Constant and Variable head tests
6. Compaction test
7. Consolidation test (to be demonstrated)
8. Direct Shear test
9. Triaxial Compression test
10. Unconfined Compression test
11. Vane Shear test
12. Differential free swell (DFS)
13. Field Plate Load Test demo
14. Field CBR demo

At least **Eight** experiments shall be conducted.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

LIST OF EQUIPMENT:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and shrinkage limits
3. Field density apparatus for
   a) Core cutter method
   b) Sand replacement method
4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
5. Hydrometer
6. Permeability apparatus for
   a) Constant head test
   b) Variable head test
7. Universal auto compactor for I.S light and heavy compaction tests.
8. Shaking table, funnel for sand raining technique.
9. Apparatus for CBR test
10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolation test apparatus with all accessories.
12. Triaxial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot air ovens (range of temperature 50^0 - 150^0C)

References:

1. 'Determination of Soil Properties' by J. E. Bowles.
2. IS Code 2720 – relevant parts.

***

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year – I Semester	Auto Cad Lab	L	T	P	C
		0	0	3	1.5

Learning Objectives: The objective of this course is: 1. To enhance the students knowledge and skills in engineering drawing. 2. To introduce computer aided drafting packages and commands for modeling and sketching. 3. To learn surface modeling techniques required designing and machining 4. To draw the geometric entities and create 2D and 3D wire frame models. 5. To learn various modelling techniques such as edit, zoom, cross hatching, pattern filling, rotation,etc.

Outcomes: Up on completion of the course, the student shall be able to : 1. Understand the paper –space environment thoroughly 2. Develop the components using 2D and 3D wire frame models through various editing commands. 3. Generate assembly of various components of compound solids.

PART-A: MANNUAL DRAFTING

UNIT-I Objective: The knowledge of projections of solids is essential in 3D modelling and animation. The student will be able to draw projections of solids. The objective is to enhance the skills they already acquired in their earlier course in drawing of projection and sections of solids. Projections Of Planes & Solids : Projections of Regular Solids inclined to both planes – Auxiliary Views. Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

UNIT-II Objective: The knowledge of development of surfaces of solids is required in designing and manufacturing of the objects. Whenever two or more solids combine, a definite curve is seen at their intersection. The intersection of solids also plays an important role in designing and manufacturing. The objective is to impart this knowledge through this topic. Development And Interpenetration Of Solids: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts. Interpenetration of Right Regular Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

UNIT-III Objective: Isometric projections provide a pictorial view with a real appearance. Perspective views provides a realistic 3D View of an object. The objective is to make the students learn the methods of Iso and Perspective views.

Isometric Projections : Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non-isometric lines. Isometric Projection of Spherical Parts. Transformation of Projections: Conversion of Isometric Views to Orthographic Views – Conventions. Perspective Projections: Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods(General Method only.

PART- B COMPUTER AIDED DRAFTING

UNIT- IV Introduction To Computer Aided Drafting: Generation of points, lines, curves, polygons, dimensioning. Types of modelling: object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modelling, 3D wire frame modelling.

UNIT -V Objective: By going through this topic the student will be able to understand the paper-space environment thoroughly. View Points And View Ports: view point coordinates and view(s) displayed, examples to exercise different options like save, restore, delete, joint, single option.

UNIT -VI Computer Aided Solid Modelling: Isometric projections, orthographic projections of isometric projections ,Modelling of simple solids, Modelling of Machines & Machine Parts.

TEXT BOOKS : 1.Engineering Graphics, K.C. john, PHI Publications

2.Engineering drawing by N.D Bhatt , Charotar publications.

REFERENCES: 1. Mastering Auto CAD 2013 or modified version and Auto CAD LT 2013or modified version – George Omura, Sybex 2. Auto CAD 2013 or modified version fundamentals- Elisemoss, SDC Publ. 3. Engineering Drawing and Graphics using Auto Cad– T Jeyapoovan, vikas 4. Engineering Drawing + AutoCAD – K Venugopal, V. Prabhu Raja, New Age 5. Engineering Drawing – RK Dhawan, S Chand 6. Engineering Drawing – MB Shaw, BC Rana, Pearson 7. Engineering Drawing – KL Narayana, P Kannaiah, Scitech 8. Engineering Drawing – Agarwal and Agarwal, Mc Graw Hill 9. Engineering Graphics – PI Varghese, Mc Graw Hill 10. Text book of Engineering Drawing with auto-CAD, K.Venkata Reddy/B.S . Publications

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year – I Semester	Skill Advanced Course/Soft Skill Course	L	T	P	C
		0	0	3	1.5
SC- Design of Special Structures					

Course Objectives

- Equipping students with the professional knowledge in the design and construction of Industrial chimneys and Water tanks
- To get the professional knowledge in the design of service reservoir and Estimation of drains for village
- To understand the design of spillway for low and medium height dams
- To estimate the concrete roads and rain water harvesting ponds

1. Design of Industrial Chimney
2. Design of water tank for apartment
3. Design of service reservoir for village
4. Design of spillway for low and medium height dams.
5. Design and estimate of Concrete Roads
6. Design and estimate of Rainwater harvesting ponds
7. Design and estimate of drains for a village

Reference Books

1) Tall Building Structures: Analysis and design, B. S. Smith and A. Coull, Wiley India Pvt Ltd., New Delhi, 2011.
2) Tall Chimneys: Design and Construction, S. N. Manohar, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1985.
3) IRC SP 042: Guidelines on Road Drainage. Indian Roads Congress, 2014.
4) Handbook of Applied Hydrology, Vijay P. Singh, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2017.
5) Dam Engineering, B. N. Asthana, Deepak Khare, Capital Publishing Company, 2019. Concrete Roads and Pavements, Edward Smith Hanson, Nabu Press, 2013
6) Rainwater Harvesting and Conservation Manual, Central Public Works Department, Government of India (Available in public domain), 2002.
7) Design of Road Drainage System, S. N. Sachdeva, Createspace Independent Publishing Platform, 2018

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year - I Semester	MC - MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	L	T	P	C
		2	0	0	0

Course Learning Objectives:

- The Learning objectives of this paper are to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting.
- To familiarize about the Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation.
- Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

Course Outcomes:

- The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product.
- The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
- The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
- The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.
- The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

Unit-I
Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

Unit – II:
Theories of Production and Cost Analyses:

Theories of Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale- Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(problems)- Managerial significance and limitations of Breakeven point.

Unit – III:
Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing, Business Cycles : Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms.

Unit – IV:
Introduction to Accounting & Financing Analysis:

Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis (Problems)

Unit – V:
Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization- Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(payback period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

TEXT BOOKS:

1. R Aryasri, Managerial Economics and Financial Analysis, The McGraw – Hill companies.

REFERENCES:

1. Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & Company Ltd,
2. JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New edition edition
3. N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & Company Ltd,
4. Maheswari S.N,AnIntroduction to Accountancy, Vikas Publishing House Pvt Ltd
5. I.M Pandey, Financial Management , Vikas Publishing House Pvt Ltd
6. V. Maheswari, Managerial Economics, S. Chand & Company Ltd,

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year - II Semester	Design and Drawing of Steel Structures	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is to:

- Familiarize Students with different types of Connections and relevant IS codes
- Equip student with concepts of design of flexural members
- Understand Design of tension and compression members in trusses
- Familiarize students with types of Columns, column bases and their Design
- Familiarize students with Plate girder and Gantry Girder and their Design

Course Outcomes:

At the end of this course the student will be able to

- Work with relevant IS codes
- Carryout analysis and design of flexural members and detailing
- Design compression members of different types with connection detailing
- Design Plate Girder and Gantry Girder with connection detailing
- Produce the drawings pertaining to different components of steel structures

UNIT – I Types of structural steel – Mechanical properties of steel – Concepts of plasticity – yield strength -Loads and Stresses – Local buckling behaviour of steel. Concepts of limit State Design – Different Limit States

– Load combinations for different Limit states - Design Strengths- deflection limits – serviceability – stability check;
Connections: Design of Connections– Different types of connections – Bolted connections –Design strength efficiency of joint
Welded connections: Advantages and disadvantages - Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of fillet weld subjected to in-plane moment acting in the plane and at right angles to the plane of the joints.

All units i.e. from unit II to unit-VI to be taught in Limit State Design and in Welded connections only.

UNIT – II

Plastic Analysis*;* Plastic moment – Plastic section modulus - Plastic analysis of continuous beams **Beams**: Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

UNIT –III Compression and Tension Members: Effective length - Slenderness ratio – permissible stresses. Design of compression members, and struts. Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.
Roof Truss Element: Different types of trusses – Design loads – Load combinations as per IS Codes

–Design of simple roof trusses involving design of purlins, rafters and joints – tubular trusses.

UNIT – IV Design of Column Foundations: Design of slab base and gusseted base. Column bases subjected moment.

UNIT – V Design of Plate Girder: Design consideration – I S Code recommendations Design of plate girder - Welded – Curtailment of flange plates, stiffeners – splicing and connections. **Design of Gantry Girder:** impact factors - longitudinal forces, Design of Gantry girders.

TEXT BOOKS

1. Steel Structures Design and Practice, N. Subramanian, Oxford University Press.
2. Limit State Design of steel structures, S. K. Duggal, Tata Mc Graw Hill, New Delhi

REFERENCES

1. Structural Design in Steel, SarwarAlamRaz, New Age International Publishers, New Delhi
2. Structural Design and Drawing by N.Krishna Raju, Universities Press
3. Design of Steel Structures by K.S.Sai Ram, Person India Education Services

IS Codes:

1. IS-I800:2007, Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi, 2008.
2. IS – 875, Code of practice for design loads (other than earth quake) for buildings and structures (Part-1-Part 5), Bureau of Indian standards.

1.Steel Tables.

These codes and steel tables are permitted to use in the examinations.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year - II Semester	**Geotechnical Engineering - II**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Learning Objectives:
The objective of this course is:

1. To impart to the student knowledge of types of shallow foundations and theories required for the determination of their bearing capacity.
2. To enable the student to compute immediate and consolidation settlements of shallow foundations.
3. To impart the principles of important field tests such as SPT and Plate bearing test.
4. To enable the student to imbibe the concepts of pile foundations and determine their load carrying capacity.

Course Outcomes:
Upon the successful completion of this course:

a. The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
b. The student must be able to compute the magnitude of foundation settlement and decide on the size of the foundation accordingly.
c. The student must be able to use the field test data and arrive at the bearing capacity.
d. The student must be able to apply the principles of bearing capacity of piles and design them accordingly.

UNIT – I

Soil Exploration: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Pressure meter – planning of Program and preparation of soil investigation report.

UNIT – II

Earth And Earth-Retaining Structures: Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions.

Rankine's & Coulomb's theory of earth pressure – Cullman's graphical method - earth pressures in layered soils.

UNIT-III

Shallow Foundations – Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity – criteria for determination of bearing capacity Factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory - IS Methods.

UNIT-IV

Shallow Foundations – Settlement Criteria: Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures.

UNIT -V

Deep Foundations:

Pile Foundation: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests - Load carrying capacity of pile groups in sands and clays.

Well Foundations: Types – Different shapes of well – Types of cassions – Components of well - functions – forces acting on well foundations - Design Criteria – Determination of staining thickness and plug - construction and Sinking of wells – Tilt and shift.

TEXT BOOKS:

1. 'Principles of Foundation Engineering' by Das, B.M., - (2011) –6th edition (Indian edition) Cengage learning
2. 'Basic and Applied Soil Mechanics' by Gopal Ranjan& ASR Rao, New Age International Pvt. Ltd, (2004).
3. Soil mechanics & foundation engineering by Arora

REFERENCES:

1. Foundation Analysis and Design' by Bowles, J.E., (1988) – 4th Edition, McGraw-Hill Publishing Company, New York.
2. 'Theory and Practice of Foundation Design' by N.N.SOM & S.C.DAS PHI Learning Private limited.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year - II Semester	Highway Engineering	L	T	P	C
		3	0	0	3

Course Learning Objectives:
The objectives of this course are:
- To impart different concepts in the field of Highway Engineering.
- To acquire design principles of Highway Geometrics and Pavements
- To acquire design principles of Intersections

Course Outcomes:
Upon the successful completion of this course, the students will be able to:
- Plan highway network for a given area.
- Determine Highway alignment and design highway geometrics.
- Design Intersections and prepare traffic management plans
- Judge suitability of pavement materials and design flexible and rigid pavements

SYLLABUS:
UNIT I Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans– First, second, third road development plans, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II Highway Geometric Design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements-Stopping sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment-Design of Super elevation and Extra widening- Design of Transition Curves- Design of Vertical alignment-Gradients- Vertical curves.

UNIT – III Traffic Engineering: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies; Speed studies –spot speed and speed & delay studies; Parking Studies; Road Accidents-Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals –Webster Method –IRC Method.

UNIT – IV Highway Materials: Subgrade soil: classification –Group Index – Subgrade soil strength California Bearing Ratio – Modulus of Subgrade Reaction. Stone aggregates: Desirable properties – Tests for Road Aggregates – Bituminous Materials: Types – Desirable properties – Tests on Bitumen - Bituminous paving mixes: Requirements – Marshall Method of Mix Design.

UNIT – V Design Of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors

Flexible Pavements*:* Design factors – Flexible Pavement Design Methods – CBR method – IRC method – Burmister method – Mechanistic method – IRC Method for Low volume Flexible pavements.
Rigid Pavements: Design Considerations – wheel load stresses – Temperature stresses –Frictional stresses – Combination of stresses – Design of slabs – Design of Joints – IRC method – Rigid pavements for low volume roads – Continuously Reinforced Cement Concrete Pavements – Roller Compacted Concrete Pavements.

TEXT BOOKS:

1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem Chand Bros., Roorkee.
2. Traffic Engineering and Transportation Planning, Kadiyali L. R, Khanna Publishers, New Delhi.

REFERENCES:

1. Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, New Delhi
2. Principles of Transportation Engineering, Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year - II Semester	Professional Elective II: a) Environmental Impact Assessment	L	T	P	C
		3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. To impart knowledge on different concepts of Environmental Impact Assessment
2. To know procedures of risk assessment
3. To learn the EIA methodologies and the criterion for selection of EIA methods
4. To know pre-requisites for ISO 14001certification
5. To know the procedures for environmental clearances and audit
6. To appreciate the importance of stakeholder participation in EIA

Course Learning Outcomes

Upon successful completion of this course, the students will be able to:

a) Prepare EMP, EIS and EIA report, estimate cost benefit ratio of a project
b) Selection of an appropriate EIA methodology
c) Evaluation of impacts on environment
d) Evaluation of risk assessment
e) Know the latest acts and guidelines of MoEF & CC

UNIT-I:

Basic concepts of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination**-** life cycle analysis preparation of Environmental Base map- Classification of environmental parameters – role of stakeholders in the EIA preparation – stages in EIA, Environmental economics, Cost/benefit Analysis - EIS and EMP. Identification of activities- application of remote sensing and GIS for EIA.

UNIT-II:

EIA Methodologies: Introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods.
Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area.

UNIT-III

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, generalized approach for assessment of Air pollution Impact.

UNIT-IV: Assessment of Impact of development Activities on Vegetation and wildlife,
Environmental Impact of Deforestation. Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment- Advantages of Environmental Risk Assessment

UNIT-V EIA: MoEF&CC Acts, Notifications and Guidelines: Provisions in the EIA notification, procedure for environmental clearance, and procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO14000. Environmental compliance reports. Case studies and preparation of EIA statement for various Industries.

Text Books:

1.Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
2.Environmental Impact Assessment Methodologies, Y. Anjaneyulu, B. S.Publication, Sultan Bazar, Hyderabad.

References:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke Prentice Hall Publishers
2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. Katania& Sons Publication, New Delhi.
3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

		L	T	P	C
III Year - II Semester	**Professional Elective II: b) Geo Spatial Technologies**	**3**	**0**	**0**	**3**

Course Objectives:

1. Understand the various spatial and non-spatial data types, and data base management
   a. techniques
2. Develop the concepts and professional skills in utility of geospatial techniques
3. Improve the working knowledge of geospatial techniques in field problems

Course Outcomes:

At the end of the course the student will be able to:

- **a)** Understand the geospatial technology relating to the data acquiring and processing that is associated with geographic locations
- **b)** Apply Geospatial techniques in the decision support systems useful for decision makers and community services.
- **c)** Ability to solve the problems related to the natural resource management, environment, urban planning and Infrastructure development, etc.
- **d)** Able to generate the thematic maps using Geospatial techniques

UNIT –I

Introduction to Remote Sensing: General background of Remote Sensing Technology, Objectives and Limitations of Remote Sensing, Electro-Magnetic Radiation, Characteristics, Interaction with Atmosphere and Earth Surface, Remote Sensing Platforms and Sensors, Satellite Characteristics, Digital Image Processing, IRS Series and High Resolution Satellites, Remote Sensing Applications to Watershed Modeling, Environmental Modeling, Urban Planning and Management.

UNIT–II

Introduction – Basic concepts, socioeconomic challenges, fundamentals of geographical information systems (GIS), history of geographical information system, components of geographical information systems.

Projections and Coordinate Systems – Map definitions, representations of point, line, polygon, common coordinate system, geographic coordinate system, map projections, transformations, map analysis.

UNIT –II

Data Acquisition: Data Types, Spatial, Non-Spatial (Attribute) Data, Data Format – Vector and Raster Data, Manual Digitizing, Scanner, Aerial Photographic Data, Remotely Sensed Data, Digital Data, Cartographic Database, Digital Elevation Data.

Data Management: Data Storage and Maintenance, Data Compression, Data Quality and Standards, Precision, Accuracy, Error – Geometric errors and corrections, Radiometric errors and corrections, types of Systematic and Non-systematic errors.

UNIT –III

Data Modeling: Spatial Data Analysis, Data Retrieval Query, Simple Analysis, Recode Overlay, Vector Data Model, Raster Data Model, Digital Elevation Model, Cost and Path Analysis, Knowledge Based System.

GIS Analysis and Functions: Organizing data for analysis, analysis function, maintenance and analysis of spatial data, buffer analysis, overlay analysis, transformations, conflation, edge matching and editing, maintenance and analysis of spatial and non-spatial data.

UNIT –IV

Applications of GIS: Environmental and Natural Resource Management, Soil and Water Resources, Agriculture, Land Use Planning, Geology and Municipal Applications, Urban Planning and Project Management, GIS for decision making under Uncertainty, standard GIS packages, Introduction to Global Positioning Systems (GPS) and its applications.

Textbook:

1. Demers, M.N, (2013). 'Fundamentals of Geographic Information Systems' Wiley India Pvt. Ltd,.
2. Burrough, P. A., and McDonnell R. A. (1998). Principles of Geographical Information Systems. Oxford University Press, New York.
3. Kang-tsung Chang. (2006). Introduction to Geographical Information Systems. Tata McGraw-Hill Publishing Company Ltd., Third Edition, New Delhi.
4. George Joseph, (2013). 'Fundamentals of Remote Sensing' Universities Press.

References:

1. Sabins F.F. Jr. (1978). Remote Sensing Principles and Interpretations. W.H. Freeman and Company, San Francisco.
2. Tor Bernhardsen. (2002). Geographical Information System. Wiley India (P) Ltd., Third Edition, New Delhi.
3. Hoffman-Wellenhof, B, et al. (1997). GPS Theory and Practice. Fourth Edition, Springer Wein, New York.
4. Lilysand T.M., and Kiefer R.W. (2002). Remote Sensing and Image Interpretation. John Wiley

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

		L	T	P	C
III Year - II Semester	**Professional Elective II: ROAD SAFETY ENGINEERING**	**3**	**0**	**0**	**3**

Course Objectives:

1. This module on the fundamental of traffic engineering & some of the statistics methods to analysis the traffic safety.
2. The accident interrogations & risk involved with measures to identity the causes are dealt.
3. The role of road safety in planning the urban infrastructures design is discussed.
4. The various traffic management systems for safety & safety improvement strategies are dealt.

Course Outcomes:

At the end of the course, students will be able to
a) To understand fundamental of Traffic Engineering
b) To investigate & determine the collective factors & remedies of accident involved.
c) To design & planning various road geometrics.
d) To massage the traffic system from road safety point of view

UNIT I

Introduction to Road Safety: Road accidents, Trends, causes, Collision diagrams; Highway safety; Human factors and road user limitations; Speed and its effect on road safety; Vehicle factors; Highway safety in India. Multi-causal dynamic systems approach to safety; Crash Vs Accident; Road safety improvement strategies; Elements of a road safety plan, Safety data Needs; Safe vehicle design.

UNIT II

Statistical Interpretation and Analysis of Crash Data: Before-after methods in crash analysis, Recording of crash data; Accident Investigation and Analysis; Statistical testing and the role of chance; Black Spot Identification and Investigations, Case Studies.

UNIT III

Road Safety Audits: Key elements of a road safety audit, Road Safety Audits & Investigations, Work zone safety audit; Crash investigation and analysis, Methods for identifying hazardous road locations, Case Studies.

UNIT IV

Crash Reconstruction: Describe the basic information that can be obtained from the roadway surface, Understand basic physics related to crash reconstruction, speed for various skid, friction, drag, and acceleration scenarios, variables involved in jump and flip crashes, variables involved in pedestrian crashes, Case Studies.

UNIT V

Mitigation Measures: Accident prevention by better planning, Accident prevention by better design of roads, Crash Countermeasures, Highway operation and accident control measures, Highway Safety Measures during construction, Highway geometry and safety; Safety in urban areas; Public transport and safety; Road safety policy making, Stakeholders involvement; Road safety law

TEXT BOOKS:

1. Institute of Transportation Engineers (ITE), The Traffic Safety Toolbox: A Primer on Traffic Safety, ITE, 1999.
2. Towards Safe Roads in Developing country, TRL – ODA, 2004.

REFERENCES:

1. Athelstan Popkess, Traffic Control and Road Accident Prevention, Chapman and Hall, 1997 (Digitized 2008)
2. Ezra Hauer, Observational Before-After Studies in Road Safety, Pergamon Press, 1997 (reprinted 2002).
3. Geetam Tiwari and Dinesh Mohan, Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer, CRC Press, 2016.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year – II Semester	SKILL ADVANCED COURSE/ SOFT SKILL COURSE-	L	T	P	C
		1	0	2	1.5
Groundwater Modelling					

1 .

Course objectives:

The course is divided into two parts:

Part I deals with surface water modelling,

Part II deals with groundwater modelling, as well as the interactions between surface water and groundwater modelling.

Out Comes

1. Outline the physical laws that describe fluids in motion in porous media
2. Apply constitutive laws of porous media flow using numerical modelling to a wide range of settings
3. Apply computational modelling of complex dynamical systems
4. Demonstrate enhanced problem-solving, critical-thinking and reasoning abilities
5. classify and evaluate hydrological (both surface water and groundwater) models
6. process and prepare data files for different models
7. solve groundwater flow equations analytically and numerically
8. use well-known models (MODFLOW, MT3D-USGS, GM, SEAWAT etc) in water resources assessment, and in solving groundwater-related problems
9. interpret, analyse and understand the model outputs

Unit-I

INTRODUCTION, Hydrologic Cycle, Formation of Precipitation, Groundwater and Aquifers, Management of Groundwater, Objectives and Scope of GWM

Unit-II

Physical hydrogeology: Porosity, Hydraulic Conductivity, Isotropy and homogeneity, Aquifers, aquitards and aquicludes, Darcy's Law and its Extensions, Aquifer Transmissivity, Equations of groundwater flow.

Unit-III

Groundwater Modeling, Horizontal Two-Dimensional Modeling of Aquifers,

Unit IV

THE FINITE ELEMENT METHOD, Steady Flow, Steady Flow in a Confined Aquifer, Steady Flow with Infiltration and Leakage, Steady Flow through a Dam, Unsteady Flow in an Aquifer, Generalization

Unit V

INTRODUCTION TO NUMERICAL METHODS, Analytical versus Numerical Solutions, Survey of Numerical Methods, modeling seawater intrusion, Modeling Regional Seawater Intrusion

Books Recommended:

1. C.W. Fetter - Applied Hydrogeology
2. M. Thangarajan - Regional Groundwater Modeling

Reference Books

1. Groundwater – M Thangarajan
2. Hydrogeology Principles and Practice – Kevin M Hiscock, Victor F Bense

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year – II Semester		**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**
STAAD Pro Lab					

Course Learning Objectives:

- learn to analyze 2 D and 3D frame steel tubular truss using structural analysis software
- learn to analyze and design retaining wall and simple towers

Course outcomes

At the end of the course the student will be able to

- use structural analysis software to analyze and design 2D and 3D frames
- design and analyze retaining wall and simple towers using STAAD software

Experiments

1. Analysis &Design determinate structures using a software
2. Analysis &Design of fixed & continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis &Design of space frames subjected to DL & LL
5. Analysis &Design of residential building subjected to all loads (DL,LL,WL,EQL)
6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Developing a design programme for foundation using EXCEL Spread Sheet
9. Detailing ofRCC beam and RCCslab
10. Detailing of Water Tank

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year – II Semester	Transportation Engineering Lab	L	T	P	C
		0	0	3	1.5

Course Learning Objectives:
The objectives of this course are:

1. To test crushing value, impact resistance, specific gravity and water absorption, attrition value, abrasion value, flakiness index and elongation index for the given road aggregates.
2. To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
3. To test the stability for the given bituminous mix
4. To carry out surveys for traffic volume, speed and parking.

Course outcomes:
At the end of the course, the student will be able to

a. Test aggregates and judge the suitability of materials for the road construction
b. Test the given bitumen samples and judge their suitability for the road construction
c. Obtain the optimum bitumen content for Bituminous Concrete
d. Determine the traffic volume, speed and parking characteristics.
e. Draw highway cross sections and intersections.

SYLLABUS:

I. ROAD AGGREGATES:

1. Aggregate Crushing value Test
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption Test
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.
5. Stripping Test
6. Viscosity Test.

III. BITUMINOUS MIX:

1. Marshall Stability test.

IV. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.
2. Traffic Volume Studies (Turning Movements) at intersection.
3. Spot speed studies.
4. Parking study.

V. DESIGN & DRAWING

1. Earthwork calculations for road works
2. Drawing of road cross sections
3. Rotary intersection design

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Elongation and thickness gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Viscometer.
11. Marshal Mix design apparatus.
12. Enoscope for spot speed measurement.
13. Stop Watches

TEXT BOOKS:

1. 'Highway Material Testing Manual' by S.K. Khanna, C.E.G Justo and A.Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.
2. Highway Material Testing & Quality Control by Rao Wiley India pvt. Ltd., Noida, New Delhi

REFERENCE BOOKS:

1. IRC Codes of Practice
2. Asphalt Institute of America Manuals
3. Code of Practice of B.I.S.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS) (REGULATIONS R-22)
Department of Civil Engineering

III Year - II Semester	MC - Employability Skills	L	T	P	C
		2	0	0	0

Course Objective: In this course the student should understand:

(i) Aptitude skill, (ii) Soft skills, (iii) Skills required for campus placement interview

Unit 1: Aptitude Skills

Quantitative Aptitude:

Numbers, HCF and LCM, Problems on ages, Averages, Ratio and Proportion, Percentages, Profit and Loss, Partnership, Interest calculations, Time and Work, Time and Distance, Pipes and Cisterns, Mensuration.

Reasoning:

Number and Letter Analogy, Coding and decoding, Odd Man out, Symbols and Notations, Permutations and Combinations, Probability, Data Interpretation, Data Sufficiency, Clocks and Calendars, Deductions, Logical Connectives, Venn Diagrams, Cubes, Binary Logic, Ordering and Sequencing, Blood relations – Syllogisms - Seating arrangement, Analytical Reasoning

Unit 2: Skills - I

Soft Skills: An Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development. Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue. Goal Setting-Vision Vs Mission Vs Goals, SMART Technique to Goal Setting, SWOT Analysis. Self Esteem: Types of Self Esteem, Causes of Low Self Esteem, Merits of Positive Self Esteem and Steps to build a positive Self Esteem; Art of Compromise, Learn to Say: 'I Don't Know', Being organized, Showing Self-awareness, Self-Assessment for Attainable Career Objectives.

Attitude & Confidence: Attitude Vs Skills Vs Knowledge, Attitude Vs Behavior, Developing Positive Attitude and Confidence; Fear- Public Speaking, Steps to Overcome Fear, developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels, Adjusting Your Attitude-Arrogance has no Place in the Workplace, Cultural Sensitivity in the Workplace, Corporate Culture: Learning How to Fit In .Motivational Talk: Team Work, Team Vs Group, Stages in Team Building, Mistakes to avoid and Lessons to Learn.

Unit 3: Skills – II:

Interpersonal Communication: Interpersonal relations; communication models, process and Barriers; team communication; developing interpersonal relationships through effective Communication; essential formal writing skills; corporate communication styles – assertion, Persuasion, negotiation. Listening: Listening Vs Hearing, Possible reasons for why people do not Listen at times, Active Listening Vs Passive Listening, Listening effect on relationships. Public Speaking: Skills, Methods, Strategies and Essential tips for effective

public speaking. Group Discussion: Importance, Planning, Elements, Skills assessed; effectively disagreeing, Initiating, Summarizing and Attaining the Objective. On-Verbal Communication: Importance and Elements; Body Language-Postures, gestures, eye contact.

Teamwork and Leadership Skills: Concept of Teams; Building effective teams; Concept of Leadership and honing Leadership skills. Presentation Skills: Types, Content, Audience Analysis, Essential Tips – Before, During and After, Overcoming Nervousness. Etiquette and Manners: Social and Business. Time Management – Concept, Essentials, Tips.

Unit 4: Personality Development: Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills. Decision-Making and Problem-Solving Skills: Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills. Conflict Management: Conflict - Definition, Nature, Types and Causes; Methods of Conflict Resolution

Stress Management: Stress - Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress; Measurement and Management of Stress. Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behavior; Assertiveness Skills. Emotional Intelligence: Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence.

Unit 5: Group Discussions (GD):

Stages of a GD, GD Vs Debate, Skills assessed in a GD, Blunders to be avoided, Dos & Don'ts, GD Practice: Conducting practice sessions and Brain Storming Sessions, Evaluation, feedback on their performance

Resume Preparation: Resume Templates, Steps followed for resume preparation, Common mistakes in a resume; Covering letter **Campus Placements Skills**: Stages of Campus Placement, Skills assessed in Campus Placements, Changing scenario and its Challenges & How to get ready, Motivational Talk on Positive Thinking: Beliefs, Thoughts, Actions, Habits & Results (Success);

Interview Skills: Types of Interview, Interviewer and Interviewee – in-depth perspectives; Before, during and after the Interview; Tips for Success, Dress code and Grooming, Dos & Don'ts, Skills assessed in an Interview, Mistakes to be avoided, How to equip oneself to excel; How to handle the typical Interview Questions; Mock Interviews: Unconventional HR questions, Practice sessions with Feedback, Simulated Testing: Previous model papers of companies, Business Terminology: Financial Terms such as Debt, Equity, Share, Working Capital, Turnover, Net worth etc.; Vision, Mission, Objectives, Goals, Targets.

Course Outcomes: After studying this course the student should able (i)To solve aptitude and reasoning problems,

(ii) Apply the soft skills in dealing the issues related to Employability

(iii) **Successful in getting employment** in campus placement interview

-References:

1) B. K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.
2) S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.
3) R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand & Company Ltd., 2018.
4) Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.