Date : 29/06/2022

Attendance sheet

The list of members of the Board of Studies in Civil Engineering

Sr. No	Member Details	Committee Designation	Sign
1	Dr. Pallavi Badry, Head, DCE, VJIT, Hyderabad	Chairperson	
2	Dr. K.M. Lakshmana Rao, Prof. CE, JNTUH, UCEH	University Nominee	
3	Dr. N. Darga Kumar, Head, DCE, JNTUH University College of Engineering, Manthani	External Member	
4	Dr. Prabhakar Singh, Head, DCE Mahindra University, Hyderabad	External Member	
5	Dr. K. Jagannadha Rao, Professor & Head, DCE, CBIT, Hyderabad.	External Member	
6	Er. N. Srinivas Rao, Reg. Head, Technical Services, UltraTech Cement, Hyderabad	External Member	
7	Dr. S. Srihari, DCE ,VJIT, Hyderabad	Internal Member	
8	Dr. N. Sudharsan, DCE ,VJIT, Hyderabad	Internal Member	
9	Dr. Kamalini Devi, DCE, VJIT, Hyderabad	Internal Member	

Chairman
BOS, CE

VIDYA JYOTHI
INSTITUTE OF TECHNOLOGY
AN AUTONOMOUS INSTITUTION

(Accredited by NAAC & NBA, Approved by AICTE New Delhi & Permanently Affiliated to JNTUH) Aziznagar Gate, C.B. Post, Hyderabad 500 075

Minutes of the BOS meeting in Department of Civil Engineering

Board of studies meeting of the Department of Civil Engineering was held on 29th June 2022 at 11.00 am in the Boards Room to discuss the following

The meeting has started with the welcome of all Board of Studies members by the chairman

Following items are discussed and approved

Sr. No	Agenda points	Resolutions
1	**BOS Agenda Point 1 : Approval of B. Tech R21 course structure & syllabi for II, III & IV years**	Detailed discussion regarding course structure, course outcomes and syllabi of UG II, III & IV year was held. Proposed course structure and syllabus were approved for R21 by all BOS members for the department of Civil Engineering for the batches admitting from AY 2021-22 onwards.
2	**BOS Agenda Point 2: Approval of Minor and Honors Program**	The BOS members discussed in details on minor and honors program offered by civil Engineering department. The proposed course structure and syllabi for both minors and honors program were approved for R21. BOS also approved the SWAYAM/NPTEL/MOOCS courses under each category of program including minor and honors for the batches admitting from AY 2021-22 onwards.
3	**BOS Agenda Point 3: Approval of the course structure of the fast track batch for the same regulation**	BOS approved the course structure of fast track batch for the same regulation.

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4	**BOS Agenda Point 4: Open Elective courses for III-I, III-II & IV-I years for R21 Regulation**	Detailed discussion regarding open elective courses, course outcomes and syllabi were held. The BOS members after thorough discussion approved the proposed open elective course offered by Civil Engineering department for R21 regulations in semesters III-I, III-II & IV-I respectively.
5	**BOS Agenda Point 5: The panel of examiners, paper setters and moderators**	It is approved that chairman is delegated all authority to appoint or change the panel of examiners, paper setters and moderators.

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R21 COURSE STRUCTURE FOR REGULAR BATCH

COURSE STRUCTURE FOR B.TECH I YEAR

B. Tech I Year I Semester

S. No	Course Category	Course Title	L	T	P	Credits
1	B S - 1	Mathematics - I	3	1	0	4.0
2	B S - 2	Engineering Physics	3	1	0	4.0
3	BS Lab - 1	Physics Lab	0	0	3	1.5
4	H & S - 1	English	2	0	0	2.0
5	H&S Lab -1	English Language Skills Lab (ELSL)	0	0	2	1.0
6	E S -1	Programming for Problem Solving - I	2	0	0	2.0
7	ES-Lab -1	Programming for Problem Solving Lab - I	0	0	2	1.0
8	E S - 2	Engineering Graphics & Modeling	1	0	3	2.5
		Total	**11**	**2**	**10**	**18**

B. Tech I Year II Semester

S .No	Course Category	Course Title	L	T	P	Credits
1	B S - 3	Mathematics - II	3	1	0	4.0
2	B S - 4	Chemistry	3	1	0	4.0
3	BS Lab - 1	Chemistry Lab	0	0	3	1.5
4	E S - 3	Engineering Mechanics	4	0	0	4.0
5	ES Lab -2	Engineering Workshop	0	1	3	2.5
6	H&S Lab -2	English Communication Skills Lab (ECSL)	0	0	2	1.0
7	E S - 4	Programming for Problem Solving - II	2	0	0	2.0
8	ES Lab -3	Programming for Problem Solving Lab -II	0	0	2	1.0
		Total	**12**	**3**	**10**	**20**

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COURSE STRUCTURE FOR B.TECH II YEAR

B. Tech. II Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	H&S - 2	Professional Communication	2	0	0	2
2	BS - 5	Numerical Methods & Partial Differential Equations	3	0	0	3
3	ES - 5	Fluid Mechanics	3	0	0	3
4	PC - 1	Solid Mechanics– I	3	1	0	4
5	PC - 2	Engineering Geology	3	0	0	3
6	PC - 3	Surveying & Geomatics	3	0	0	3
7	PC Lab - 1	Surveying & Geomatics Lab	0	0	2	1
8	PC Lab - 2	Engineering Geology Lab	0	0	2	1
9	MC - 1	Environmental Science	2	0	0	-
		Total	**19**	**1**	**4**	**20**

B. Tech. II Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	BS - 6	Probability and Statistics	3	0	0	3
2	ES - 6	Principles of Electrical Engineering	3	0	0	3
3	PC - 4	Solid Mechanics - II	3	0	0	3
4	PC - 5	Concrete Technology	3	0	0	3
5	PC - 6	Structural Analysis	3	0	0	3
6	PC - 7	Building Materials and construction	3	0	0	3
7	ES Lab - 4	Computer Aided Drafting Lab	0	0	2	1
8	PC Lab - 3	Solid Mechanics Lab	0	0	2	1
9	MC - 2	Gender sensitization	2	0	0	-
		Total	**20**	**0**	**4**	**20**

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COURSE STRUCTURE FOR B.TECH III YEAR

B. Tech. III Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	H&S-3	Managerial Economics and Financial Analysis	3	0	0	3
2	PC -8	Hydraulics & Hydraulic Machinery	3	0	0	3
3	PC - 9	Geotechnical Engineering	3	0	0	3
4	PC - 10	Design of Reinforced Concrete Structures	3	0	0	3
5	PE - 1	1. Advanced Structural Analysis 2. Building planning & Drawing 3. Air Pollution and Control Methods	3	0	0	3
6	OE - 1	Open Elective	3	0	0	3
7	PC Lab - 4	Geotechnical Engineering Lab	0	0	2	1
8	PC Lab - 5	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1
9	H&S-4	Personality Development & Behavioural Skills	2	0	0	1
		Total	**20**	**0**	**4**	**21**

B. Tech. III Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	PC - 11	Highway Engineering	3	0	0	3
2	PC - 12	Foundation Engineering	3	0	0	3
3	PC - 13	Environmental Engineering	3	0	0	3
4	PC - 14	Water Resources Engineering	3	0	0	3
5	PE - 2	1. Construction Engineering& Management 2. Ground Improvement Techniques 3. Finite Element Method	3	0	0	3
6	OE - 2	Open Elective	3	0	0	3
7	PC Lab - 6	Environmental Engineering Lab	0	0	2	1
8	H&S Lab - 3	Advanced Communication Skills Lab	0	0	2	1
9	ES - 7	Quantitative Methods & Logical Reasoning	2	0	0	1
		Total	**20**	**0**	**4**	**21**

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COURSE STRUCTURE FOR B.TECH IV YEAR

B. Tech. IV Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	PC - 15	Design of Steel Structures	3	0	0	3
2	PC - 16	Estimation & Costing	3	0	0	3
3	PE - 3	1. Pre stressed Concrete Structure 2. Earthquake Engineering 3. Green Building Technologies	3	0	0	3
4	PE - 4	1. Railways Airports and HarbourEngineering 2. Advanced Structural Design 3. Ground water Hydrology	3	0	0	3
5	OE - 3	Open Elective	3	0	0	3
6	PC Lab - 7	Concrete & Highway Materials Lab	0	0	2	1
7	PC Lab - 8	Computational Lab	0	0	2	1
8	PW-1	Industry Oriented Mini Project	0	0	0	3
		Total	**15**	**0**	**4**	**20**

B. Tech. IV Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	PC - 17	Rehabilitation and Retrofitting ofstructures	3	0	0	3
2	PC - 18	Remote Sensing & GIS	3	0	0	3
3	–	Technical Seminar	0	2	0	2
4	–	Comprehensive Viva Voce	0	0	0	2
5	PW-2	Major Project	0	0	20	10
		Total	**6**	**2**	**20**	**20**

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R21 COURSE STRUCTURE FOR FAST-TRACK BATCH

COURSE STRUCTURE FOR B.TECH I YEAR

B.Tech I Year I Semester

S. No	Course Category	Course Title	L	T	P	Credits
1	B S - 1	Mathematics - I	3	1	0	4.0
2	B S - 2	Engineering Physics	3	1	0	4.0
3	BS Lab - 1	Physics Lab	0	0	3	1.5
4	H & S - 1	English	2	0	0	2.0
5	H&S Lab -1	English Language Skills Lab (ELSL)	0	0	2	1.0
6	E S -1	Programming for Problem Solving - I	2	0	0	2.0
7	ES-Lab -1	Programming for Problem Solving Lab - I	0	0	2	1.0
8	E S - 2	Engineering Graphics & Modeling	1	0	3	2.5
		Total	**11**	**2**	**10**	**18**

B.Tech I Year II Semester

S No	Course Category	Course Title	L	T	P	Credits
1	B S - 3	Mathematics - II	3	1	0	4.0
2	B S - 4	Chemistry	3	1	0	4.0
3	BS Lab - 1	Chemistry Lab	0	0	3	1.5
4	E S - 3	Engineering Mechanics	4	0	0	4.0
5	ES Lab -2	Engineering Workshop	0	1	3	2.5
6	H&S Lab -2	English Communication Skills Lab (ECSL)	0	0	2	1.0
7	E S - 4	Programming for Problem Solving - II	2	0	0	2.0
8	ES Lab -3	Programming for Problem Solving Lab - II	0	0	2	1.0
		Total	**12**	**3**	**10**	**20**

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COURSE STRUCTURE FOR B.TECH II YEAR

B. Tech. II Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	H&S -2	Professional Communication	2	0	0	2
2	BS - 5	Numerical Methods & Partial DifferentialEquations	3	0	0	3
3	ES - 5	Fluid Mechanics	3	0	0	3
4	PC - 1	Solid Mechanics - I	3	1	0	4
5	PC - 2	Engineering Geology	3	0	0	3
6	PC - 3	Surveying & Geomatics	3	0	0	3
7	PC Lab - 1	Surveying & Geomatics Lab	0	0	2	1
8	PC Lab - 2	Engineering Geology Lab	0	0	2	1
9	MC - 1	Environmental Science	2	0	0	-
		Total	**19**	**1**	**4**	**20**

B. Tech. II Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	BS - 6	Probability and Statistics	3	0	0	3
2	ES - 6	Principles of Electrical Engineering	3	0	0	3
3	PC - 4	Solid Mechanics - II	3	0	0	3
4	PC - 5	Concrete Technology	3	0	0	3
5	PC - 6	Structural Analysis	3	0	0	3
6	PC - 7	Building Materials and construction	3	0	0	3
7	ES Lab - 4	Computer Aided Drafting Lab	0	0	2	1
8	PC Lab - 3	Solid Mechanics Lab	0	0	2	1
9	MC - 2	Gender sensitization	2	0	0	-
		Total	**20**	**0**	**4**	**20**

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COURSE STRUCTURE FOR B.TECH VII YEAR

B. Tech. III Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	H&S-3	Managerial Economics and Financial Analysis	3	0	0	3
2	PC -8	Hydraulics & Hydraulic Machinery	3	0	0	3
3	PC - 9	Geotechnical Engineering	3	0	0	3
4	PC - 10	Design of Reinforced Concrete Structures	3	0	0	3
5	PE - 1	1. Advanced Structural Analysis 2. Building planning & Drawing 3. Air Pollution and Control Methods	3	0	0	3
6	OE - 1	Open Elective	3	0	0	3
7	PC Lab - 4	Geotechnical Engineering Lab	0	0	2	1
8	PC Lab - 5	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1
9	H&S-4	Personality Development & Behavioural Skills	2	0	0	1
		Total	**20**	**0**	**4**	**21**

B. Tech III Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	PC - 11	Highway Engineering	3	0	0	3
2	PC - 12	Foundation Engineering	3	0	0	3
3	PC - 13	Environmental Engineering	3	0	0	3
4	PC - 14	Water Resources Engineering	3	0	0	3
5	PC - 15	Rehabilitation and Retrofitting of structures	3	0	0	3
6	PE - 2	1. Construction Engineering & Management 2. Ground Improvement Techniques 3. Finite Element Method	3	0	0	3
7	OE - 2	Open Elective	3	0	0	3
8	PC Lab - 6	Environmental Engineering Lab	0	0	2	1
9	H&S Lab-1	Advance Communication Skills Lab	0	0	2	1
10	ES - 2	Quantitative Methods & Logical Reasoning	2	0	0	1
		Total	**23**	**0**	**4**	**24**

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COURSE STRUCTURE FOR B TECH VIII YEAR

B. Tech. IV Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	PC - 16	Design of Steel Structures	3	0	0	3
2	PC - 17	Estimation & Costing	3	0	0	3
3	PC - 18	Remote Sensing & GIS	3	0	0	3
4	PE - 3	1. Pre stressed Concrete Structure 2. Earthquake Engineering 3. Green Building Technologies	3	0	0	3
5	PE - 4	1. Railways Airports and Harbour Engineering 2. Advanced Structural Design 3. Ground water Hydrology	3	0	0	3
6	OE - 3	Open Elective	3	0	0	3
7	PC Lab - 7	Concrete & Highway Materials Lab	0	0	2	1
	PC Lab - 8	Computational Lab	0	0	2	1
8	PW-1	Industry Oriented Mini Project	0	0	0	3
		Total	**18**	**0**	**4**	**23**

B. Tech. IV Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	--	Technical Seminar	0	2	0	2
2	--	Comprehensive Viva Voce	0	0	0	2
3	PW-2	Major Project	0	0	20	10
		Total	**0**	**2**	**20**	**14**

OPEN ELECTIVES OFFERED BY CIVIL ENGINEERING DEPARTMENT

Category	Course Title
OE-1	1. Elements of civil Engineering 2. Smart cities 3. Disaster Management
OE-2	1. Green building Technologies 2. Environmental Pollution & control methods 3. Construction Management
OE-3	1. Remote Sensing & GIS 2. Introduction to earthquake Engineering 3. Solid Waste Management

COURSE STRUCTURE FOR B.TECH II YEAR

B. Tech. II Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	H&S 2	Professional Communication	2	0	0	2
2	BS 8	Numerical Methods & Partial Differential Equations	3	0	0	3
3	ES 8	Fluid Mechanics	3	0	0	3
4	PC 1	Solid Mechanics 1	3	1	0	4
5	PC 2	Engineering Geology	3	0	0	3
6	PC 3	Surveying & Geomatics	3	0	0	3
7	PC Lab 1	Surveying & Geomatics Lab	0	0	2	1
8	PC Lab 2	Engineering Geology Lab	0	0	2	1
9	MC 1	Environmental Science	2	0	0	-
		Total	**19**	**1**	**4**	**20**

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FLUID MECHANICS

B.Tech II Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Understand different properties of fluid and the relationship between them.
CO2: Explain the Continuity equation for one dimensional, two dimensional and three dimensional flows.
CO3: Apply the Euler's and Bernoulli's equations in practical civil engineering problems.
CO4: Analyse head losses in pipes and flow between parallel plates.
CO5: Demonstrate the boundary layer concepts and its separation.

UNIT – I

Introduction: Dimensions and units – Physical properties of fluids, specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion pressure at a point, Pascal's law, Hydrostatic law – atmospheric, gauge and vacuum pressure – measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers. Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

UNIT – II

Fluid kinematics: Description of fluid flow, Stream line, path line, streak lines 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, flownet analysis.

UNIT – III

Fluid dynamics and measurement of flow: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, Navier – Stoke's equations (Explanationary), Momentum equation and its application – forces on pipe bend. Pitot tube, Venturi meter and orifice meter – classification of orifices, flow over rectangular, triangular, trapezoidal and Stepped notches. Broadcrested weirs.

UNIT – IV

Closed conduit flow: Reynold's experiment – Characteristics of Laminar & Turbulent flows. Laws of Fluid friction – Darcy's equation, ,variation of friction factor with Reynold's number – Moody's Chart. Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems, flow between parallel plates, flow through long tubes, flow through inclined tubes.

UNIT – V

Boundary Layers: Boundary layer – concepts, Characteristics of boundary layer along a thin flat plate, Prandtl contribution, Von karmen momentum integral equation, laminar and turbulent boundary layers (no derivations) BL in transition, separation of BL, control of BL, flow around submerged objects – Drag and Lift – Magnus effect.

Text Books:

1. Hydraulics and Fluid Mechanics (Including Hydraulics Machines), Modi and Seth, Standard book house, 22nd Edition, 2019.

Reference Books:

1. A Textbook of Fluid Machines, R. K. Rajput, S. Chand & Company Ltd, 5th Edition, 2013.

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SOLID MECHANICS - I

B Tech II Year I Semester - CIVIL

L	T	P	C
3	1	0	4

Course Outcomes

After completion of this course students will be able to

CO1: Examine stress - strain, elastic constants and strain energy.

CO2: Analyse the shear force and bending moment diagrams of beams and relationship between them.

CO3: Evaluate the flexural and shear stresses for various beam cross sections.

CO4: Calculate principal stresses and strains using analytical and graphical solutions for the safety using failure theories.

CO5: Determine the deflections of beams with various loadings using different methods.

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 modulo and the relationship between them - Bars of varying section - composite bars - Temperature stresses. Elastic constants.

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 – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads - Point of contra flexure - Relation between S.F, B.M and rate of loading at a section of a beam.

UNIT – III

Flexural Stresses: Theory of simple bending - Assumptions - Derivation of bending equation: M/I = fy /y =E/R - Neutral axis - Determination of 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, triangular, I, T angle sections.

UNIT – IV

Principal Stresses and Strains: 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.

UNIT – V

Deflection of Beams: Bending into a circular arc - slope, deflection and radius of curvature - Differential equation for the elastic line of a beam - Double integration and Macaulay's methods - Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, Uniformly varying load - Mohr's theorems - Moment area method - application to simple cases including overhanging beams.

Text Books

1. Strength of Materials, R.K. Bansal, Lakshmi Publications Pvt. Ltd, 6th Edition, 2015.

Reference Books

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1. Mechanics of Structures Vol. 1, H.J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt. 31st Edition, 2014
2. Strength of Materials, D S Prakash Rao, Universities Press Pvt. Ltd. 2nd Edition 1999

ENGINEERING GEOLOGY

B.Tech II Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Classify and compare different rocks and minerals across the construction site

CO2: Identify and build the knowledge on main and most common igneous, sedimentary and metamorphic rocks encountered by foundations and sites.

CO3: Define And Interpret The Geological Structures In The Geological Maps And Cross Sections

CO4: Understand the importance of graphical studies and various geophysical methods.

CO5: Illustrate the factors which affect the dams, reservoirs and tunnels.

UNIT – I

Introduction: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

Weathering of rocks: Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like "Granite"

UNIT – II

Mineralogy: Definition of mineral. Importance of study of minerals. Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals.Study of physical properties of some common rock forming minerals.[Examples: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chromite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite]

Petrology: Definition of rock, Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous, Sedimentary and metamorphic rocks their distinguishing features. Megascopic and microscopic study of rocks[eg: Granite, Dolerite, Basalt, Pegmatite, Lacrite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate]

UNIT – III

Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types and case studies. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India. Stabilisation of soils, Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration

UNIT – IV

Importance of geophysical studies: Principles of geophysical study by Gravity methods, Magnetic methods, Electrical methods, Seismic methods, Radiometric methods and Geothermal method, Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc, fundamental aspects of rock mechanics and Environmental Geology

UNIT – V

Geology of Dams, Reservoirs And Tunnels: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site, analysis of dam failures of the past, factor's contributing to the success of a reservoir, geological factors influencing water tightness and life of reservoirs – Purposes of tunneling, effects of Tunneling on the ground role of Geological Considerations (i.e., Lithological, structural and ground water) in tunneling over break and lining in tunnels

Text Books

1. 2. 3. 4. 5.

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1 Engineering Geology, N. Chennakesavulu, Trinity (Laxmi Publications Ltd.), 2nd Edition, 2005

Reference Books

1 Principles of Engineering Geology & Geotechnics, DP Krynine & W R Judd, CBS Publishers,1st E Book Edition, 2018

2 Engineering Geology, Subinoy Gangopadhyay, Oxford university press, 1st Edition, 2013.

3 Engineering Geology for Civil Engineers, P.C. Varghese, PHI Learning, 1st Edition, 2012.

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SURVEYING & GEOMATICS

B.Tech II Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Identify a detailed surveying at any site by any method.
CO2: Ability to use modern survey equipment to measure angles and distances.
CO3: Compute the differences in elevation draw and utilize contour plots, volumes for earthwork.
CO4: Understand the working principles of modern equipment and its methodologies.
CO5: Analyze the basic concept of GPS and its applications.

UNIT – I

Introduction to surveying: Overview of plane surveying (chain, compass, theodolite and plane table). Objectives, Principles and classifications, Scales, Conventional Symbols, Signals.

UNIT – II

Distances and direction: Distance measurement methods, use of chain, tape and electronic distance measurements, meridians, azimuths and bearings, declination, computation of angle.

UNIT – III

Leveling and contouring: Concept and Terminology, Temporary adjustments – method of leveling, Characteristics and Uses of contours – methods of conducting contour surveys and their plotting, Embankments and cutting for a level section and two level sections with and without transverse slopes.

UNIT – IV

Modern field surveying systems, Principle of electronic distance measurements, types of EDM instruments, distomat, total station – parts of a total station – accessories – advantages and applications, field procedure for total station survey, errors in total station survey.

UNIT – V

Introduction to Geomatics: Global positioning systems – segments, GPS measurements, errors in biases, surveying with GPS, Co-ordinate transformation, accuracy considerations, electromagnetic spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, Remote sensing data acquisition, platforms and sensors, visual image interpretation, digital image processing.

Text Books:

1. Surveying (Vol – I & 2), Duggal S.K., Tata Mc Graw Hill Publishing Co. Ltd. New Delhi, 4th Edition, 2004.
2. Remote sensing geographical Information system, Anji Reddy M., B.S. publications, 3rd Edition, 2008.

Reference Books:

1. Surveying and Leveling, R. Subramanian, Oxford University Press, 2nd Edition, 2012.
2. Advanced Surveying (Total Station GIS and Remote Sensing), Satheesh Gopi, R. Sathi Kumar and N. Madhu, Pearson Education India, 1st Edition, 2007.

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SURVEYING & GEOMATICS LAB

B. Tech II Year I Semester – CIVIL

VJIT-B Tech – R21

L	T	P	C
0	0	2	1

Course Outcomes

After completion of this course students will be able to

CO1: Apply the principle of surveying for civil engineering applications

CO2: Apply the knowledge to calculate areas, drawing plans and contour maps using different measuring equipment at field level

CO3: Identify data collection methods and prepare field notes

CO4: Understand the working principles of survey instruments, measurement errors and corrective measures

CO5: Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and its methodologies

List of experiments

1. Survey of an area by chain surveying
2. Determination of two inaccessible points by using prismatic compass
3. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment
4. Radiation & intersection method by plane table survey (Any one exercise)
5. Exercise on fly levelling using dumpy level
6. An exercise on I. S. O. S and Plotting
7. Trigonometric leveling – Heights and distance problem
8. Determination of Area & Remote height using total station
9. Traversing & Contouring using total station
10. Distance, gradient, Diff. height between two inaccessible points using total station
11. Study on use of GPS for data collection
12. Collection of Point Data, Line Data and Polygon Data using GPS

ENGINEERING GEOLOGY LAB

VJIT-B.Tech – R21

B.Tech II Year I Semester – CIVIL

L	T	P	C
0	0	2	1

Course Outcomes

After completion of this course students will be able to

CO1 To study the physical properties and identification of minerals referred under the theory

CO2 Describe and identify the rocks referred under the theory

CO3 Illustrate the Microscopic study of rocks.

CO4 Interpret and draw the sections for geological maps showing tilted beds, faults, unconformities etc.,

CO5 Solve the simple structural geological problems

List of Experiments

1. Study of physical properties and identification of minerals.
2. Study of physical properties and identification of rocks(igneous)
3. Study of physical properties and identification of rocks(sedimentary)
4. Study of physical properties and identification of rocks(metamorphic)
5. Microscopic study of rocks
6. Microscopic study of minerals
7. Study of geological structures like faults and folds
8. Study of geological structures like tilted bed models and unconformities
9. Interpretation and drawing of sections for geological maps showing tilted beds
10. Interpretation and drawing of sections for geological maps showing faults , unconformities.
11. Simple structural geology problems on Strike
12. Simple structural geology problems on Dip

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B. Tech. II Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	BS 6	Probability and Statistics	3	0	0	3
2	ES 6	Principles of Electrical Engineering	3	0	0	3
3	PC 4	Solid Mechanics - II	3	0	0	3
4	PC 5	Concrete Technology	3	0	0	3
5	PC 6	Structural Analysis	3	0	0	3
6	PC 7	Building Materials and construction	3	0	0	3
7	ES Lab 4	Computer Aided Drafting Lab	0	0	2	1
8	PC Lab 3	Solid Mechanics Lab	0	0	2	1
9	MC 2	Gender sensitization	2	0	0	-
		Total	**20**	**0**	**4**	**20**

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SOLID MECHANICS – II

VJIT-B.Tech – R21

B.Tech II Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Design and safety of the shaft subjected to Torsion and bending moment.

CO2: Calculate the Column capacity for various end conditions due to axial and eccentric loading.

CO3: Apply the concepts of direct and bending stresses to evaluate the safety of Structures.

CO4: Evaluate the stresses and strains in thin shells and Thick Cylinders.

CO5: Determine the stresses due to Unsymmetrical bending of beams and locate the shear centre.

UNIT – I

Torsion of circular shafts: Theory of pure torsion – Derivation of Torsion equations T/J = q/r = N0/L – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending, 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 – springs in series and parallel.

UNIT – II

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 – Perry's formula.

UNIT – III

Direct and bending stresses: Stresses under the combined action of direct loading and bending moment, 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 bending moment about both axis.

UNIT – IV

Thin Shells: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia. and volume of thin cylinders – Thin spherical shells.

Thick cylinders: Introduction – Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage.

UNIT – V

Unsymetrical 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 axis – 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 centre for symmetrical and unsymmetrical (channel, L, T and Z) sections.

Text Books:

1) Strength of Materials, R. K. Bansal, Lakshmi Publications House Pvt. Ltd. 6th Edition, 2015.

Reference Books:

1) Strength of Materials, S.S. Bhavikatti, Vikas Publishing House Pvt. Ltd. 4th Edition, 2008.

2) Mechanics of Materials, R. C. Hibbeler, Pearson Education, 9th Edition, 2014.

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CONCRETE TECHNOLOGY

B Tech II Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

CO1: Understanding the properties of cements and admixtures.
CO2: Analyse the properties of aggregates.
CO3: Evaluate the properties of fresh concrete.
CO4: Analyse the behavior of hardened concrete and durability of concrete.
CO5: Design the concrete mix using IS Code and describe the special concretes.

UNIT – I

Cement: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement.

Admixtures: Types of admixtures – mineral and chemical admixtures.

UNIT – II

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

UNIT – III

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 – Steps in manufacture of concrete – Quality of mixing water.

UNIT – IV

Hardened Concrete : Water / Cement ratio – Abram's Law – Gelspace ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength

Testing of Hardened Concrete: Compression test – Tension tests – Flexure tests – Splitting tests – Non-destructive testing methods.

Elasticity, Creep & Shrinkage – Modulus of elasticity – Dynamic modulus of elasticity – Possisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT – V

Mix Design :Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

Special Concretes: Introduction to Light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete – Self compacting concrete.

Text Books

1. Concrete Technology, M.S.Shetty, S.Chand & Co, 7th Edition, 2015.
2. Concrete Technology, A.R. Santha Kumar, Oxford university Press, New Delhi, 9th Edition, 2012.

Reference Books:

1. 2. 3. 4. 5.
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1. Properties of Concrete, A. M. Neville, Pearson publisher, 5th Edition, 2011.
2. Concrete Technology, M.L. Gambhir, Tata Mc Graw Hill Publishers, New Delhi, 5th Edition, 2004.

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STRUCTURAL ANALYSIS

B Tech II Year II Semester CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Analyze propped cantilever, fixed beams for external loadings and support settlements

CO2: Understand the concept of Slope, deflection, moment distribution method and analyses of continuous beams

CO3: Examine the beams and arches

CO4: Analyze the pin jointed plane frames

CO5: Draw the influence line diagrams for moving loads

UNIT – I

Propped cantilever and fixed beams: Determination of static and kinematic indeterminacies for beams. Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia, subjected to uniformly distributed 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 for Propped Cantilever and Fixed Beams. Deflection of Propped cantilever and fixed beams, effect of sinking of support, effect of rotation of a support.

UNIT – II

Continuous beams: Introduction. Continuous beams, Clapeyron's theorem of three moments. Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed, continuous beams with overhang. Effects of sinking of supports. Derivation of slope – deflection equation, application to continuous beams with and without settlement of supports. Analysis of continuous beams with and without settlement of supports using Moment Distribution Method, Shear force and Bending moment diagrams.

UNIT – III

Energy theorems: Introduction. Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces. Castigliano's first theorem. Unit Load Method. Deflection of simple beams and statically determinate bent frames.

Arches: Introduction. Types of Arches. Comparison between Three hinged and Two hinged Arches. Linear Arch. Eddy's theorem. Analysis of Three hinged arches (Circular and parabolic arches without temperature effect and yielding of support).

UNIT – IV

Analysis of perfect frames: Types of frames. Perfect, Imperfect and Redundant pin jointed frames. Analysis of determinate pin jointed frames using method of joints, method of sections for vertical loads, horizontal loads and inclined loads.

UNIT – V

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 section. Point loads, U.D.L. longer than the span, U.D.L. shorter than the span. Influence lines for forces in members of Pratt and Warren trusses. Equivalent uniformly distributed load.

Text Books:

1. 2. 3. 4. 5.

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1. Theory of Structures, S. Ramamrutham and R. Narayan, Dhanapat Rai Publishing company (P) Ltd, 9th Edition 2015.
2. Structural Analysis (Vol I & II), V.N.Vazirani and M.M.Ratwani, Khanna Publishers, 17th Edition, 2015.

Reference Books:

1. Structural Analysis (Vol I & II), G.S. Pandit and S. P.Gupta, Tata McGraw Hill Education Pvt. Ltd, 2nd Edition, 2008
2. Structural Analysis (Vol I & II), S.S. Bhavikatti, Vikas Publishing House Pvt Ltd, 4th Edition, 2011

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BUILDING MATERIALS AND CONSTRUCTIONS

B.Tech II Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Identify various building materials and to understand their basic properties.

CO2: Understand the minimum standards required to designate and use the materials in construction.

CO3: Discuss type metals and finishes used in the construction process.

CO4: Understand modern materials in general construction practice.

CO5: Recognize the concept of plastering, pointing and various other building services.

UNIT – I

Stones & Bricks: Building stones – classifications and quarrying – properties – structural requirements. Composition of Brick earth – manufacture and structural requirements, classification – Field and laboratory tests on bricks (compressive strength, water absorption, efflorescence, dimension and warpage).

Masonry: Definition and terms used in masonry. Brick masonry, characteristics and requirements of good brick masonry. Bonds in brick work, Header, Stretcher, English, Flemish bond. Stone masonry. Requirements of good stone masonry. Classification, characteristics of different stone masonry. Joints in stone masonry. Types of walls: load bearing, partition walls, cavitywalls.

UNIT – II

Cement & Admixtures: Ingredients of cement – manufacture – Chemical composition – different types of cement and its uses. Hydration – field & lab tests on cements. Admixtures – mineral & chemical admixtures – uses.

Tiles, Timber and Glass: Introduction, Classification of Tiles, Tests on Tiles (Water absorption, Bulk density & Abrasion). Timber Structure, Types and properties, seasoning. Glass – properties, classification.

UNIT – III

Metals in constructions: Principle and characteristics of steel. Aluminium. Classification of steel. Tests on metals (Tension, Brittleness test, hardness test)

Paints: Purpose, types, ingredients and defects. Preparation and applications of paints to new and old plastered surfaces, wooden and steel surfaces.

UNIT – IV

Miscellaneous Materials: Gypsum – Classification, Plaster of Paris, Gypsum wall Plasters, Gypsum Plaster Boards, Adhesives, Heat and sound insulating materials, Geosynthetics.

Modern Materials: Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles – Geomembranes and Geotextiles for earth reinforcement.

UNIT – V

Plastering and Pointing: Purpose, materials and methods of plastering and pointing, defects in plastering – Stucco plastering, lathe plastering. Damp proofing – causes, effects and methods. Formwork – Requirements – types of form work – standards – scaffolding – shoring – underpinning.

Text Books:

1. Engineering Materials, Rangwala, S. Chand and Company Ltd, 29th Edition, 2009.
2. Building Construction, B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications (P) ltd., 10th Edition, 2008.

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Reference Books:

1. Building Materials, S. K. Duggal, New Age International, 4th Edition, 2016
2. Building Materials, P.C. Varghese, PHI, 2nd Edition, 2015

COMPUTER AIDED DRAFTING LAB

B.Tech II Year II Semester – CIVIL

L	T	P	C
0	0	2	1

Course Outcomes

After completion of this course students will be able to

CO1: Assess the Software with aiding source.
CO2: Demonstrate the different modes of commands.
CO3: Draft the plan, Elevation & Sectional Views of the building.
CO4: Develop the components of the building
CO5: Replicate the complete detailing of Building with BIM input.

List of Experiments

1. Introduction to concept of drawings through computer aided drafting (CAD)
2. Practice exercises on coordinate system reference planes , initial settings, drawing aids , Presentation norms and standards.
3. Practice Exercises on commands- drawing , Modifying, layers, text, blocks and dimensioning.
4. Practice on symbols and signs (materials, Architectural , structural , Electrical, Plumbing)
5. Drawing of single line plan - Single storey buildings .
6. Drawing of plans of Multi storied buildings with Brick thickness (Max G+2)
7. Developing sections and elevations of Single storey buildings
8. Detailing of different types (any 2 types) of doors and its components by using CAD
9. Detailing of different types (any 2 types) of windows and its components by using CAD
10. Exercises on the development of working of building (working drawing) by using CAD
11. Drawing the complete layout of structure (Educational building)
12. Fundamentals of Building Information Modelling (BIM)

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SOLID MECHANICS LAB

B.Tech II Year II Semester – CIVIL

L	T	P	C
0	0	2	1

Course Outcomes:

After completion of this course students will be able to:

CO1: Demonstrate the behavior of materials under impact, hardness, tension and compression loads
CO2: Determine elastic constants by flexural and torsion test
CO3: Observe spring constants under various loading
CO4: Understand the deflection of materials under bending
CO5: Compute basic material properties strain and stress

List of Experiments

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam
3. Bending test on simple support beam
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams
11. Use of electrical resistance strain gauges
12. Continuous beam – deflection test

B. Tech. III Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	H&S- 3	Managerial Economics and Financial Analysis	3	0	0	3
2	PC -8	Hydraulics & Hydraulic Machinery	3	0	0	3
3	PC -9	Geotechnical Engineering	3	0	0	3
4	PC -10	Design of Reinforced Concrete Structures	3	0	0	3
5	PE - 1	1. Advanced Structural Analysis 2. Building planning & Drawing 3. Air Pollution and Control Methods	3	0	0	3
6	OE - 1	Open Elective	3	0	0	3
7	PC Lab - 4	Geotechnical Engineering Lab	0	0	2	1
8	PC Lab - 5	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1
9	H&S-4	Personality Development & Behavioural Skills	2	0	0	1
		Total	**20**	**0**	**4**	**21**

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HYDRAULICS & HYDRAULIC MACHINERY

B.Tech III Year I Semester – Civil

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

CO1: Determine the Froude number for a given flow to differentiate concepts of sub-critical, critical, and super-critical flows

CO2: Compute the non-uniform flow depths for gradually and rapid varied flow

CO3: Apply dimensional analysis to predict physical parameters that influence the flow in fluid mechanics and use dimensionless parameters

CO4: Compute efficiencies of different types of turbines

CO5: Use performance curves to predict performance of centrifugal pumps.

UNIT – I

Open channel flow-I

Introduction: Definition of open channel, Comparison between pipe flow and open-channel flow, Types of open channels, Geometric elements and hydraulic properties of an open channel section,Classification of open-channel flows – steady, unsteady, uniform, non-uniform, gradually varied, rapidly varied, spatially varied.

Uniform Flow: through open channel by Chezy's, Manning's, Kutter's, and Bazin formulae,, Computation of normal depth hydraulically efficient channel section.

Critical Flow: Specific energy, critical depth, computation of critical depth, critical, sub-critical, and super critical flows, alternate depths, Transitions – channel with a hump, and change in width.

UNIT – II

Open channel flow-II

Non Uniform flow: Gradually Varied Flow: Basic assumptions, Derivation of differential equation of GVF, Characteristics and classification of flow profiles for Mild, Critical, Steep, horizontal, and adverse slopes, control sections, Computation of GVF by numerical method – Direct-Step method,

Rapidly Varied Flow: Characteristics of RVF, Hydraulic Jump in horizontal rectangular channels – momentum equation, formulation for the jump, energy loss, Classification of jumps according to Froude's number, Basic characteristics of the jump - Height of jump, length of jump, location of jump.

UNIT – III

Dimensional Analysis: Philosophy of DA, Principle of Dimensional Homogeneity, Methods used - Rayleigh's method and Buckingham's Pi theorem; Common dimensionless groups in fluid mechanics.

Modelling and Similitude: Geometric, kinematic, and dynamic similarities, Similarity requirements or modelling laws, model and prototype relations, Definition of distorted and non-distorted models

UNIT – IV

Impact of jets: 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

Turbines: Layout of a typical Hydroelectric power plant: heads and efficiencies- Classification of turbines- pelton wheel turbine- francies turbine- Kaplan turbine: working proportions, velocity diagrams, work done, and efficiencies of turbine, governing of turbines

UNIT – V

Centrifugal Pumps: Components of a centrifugal pump, Working of a centrifugal pump, classification of pumps, Expression for work done on the impeller, heads of pumps, losses and efficiencies, minimum starting speed, Multistage

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pumps – Pumps in series and parallel. Performance of pumps: characteristic curves. Net positive suction head: cavitation.

Text Books:

1. Hydraulics and Fluid Mechanics (Including Hydraulics Machines), Modi and Seth, Standard book house, 22nd Edition, 2019

Reference Books:

2. A Textbook of Fluid Machines, R. K. Rajput, S. Chand & Company Ltd, 5th Edition, 2013.

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GEOTECHNICAL ENGINEERING

B.Tech III Year I Semester – CIVIL

L	T	P	C
3	0	0	3

III Year I Semester

Course outcomes

After completion of this course students will be able to

CO1 Illustrate the soil formation and classification

CO2 Explain the Hydrostatic effect in soil mass.

CO3 Illustrate the stress distribution mechanism and compaction in soil mass.

CO4 Illustrate the mechanism of consolidation.

CO5 Identify the Shear strength parameters through analytical and experimental approach.

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 – I.S. Classification of soils.

UNIT – II

Permeability: Soil water – capillary rise – flow of water through soils – Darcy's law, Permeability – Factors affecting – laboratory determination of coefficient of permeability – Permeability of layered soils – Insitu permeability tests (Pumping in & pumping out test).

Effective stress & seepage through soils: Total, neutral and effective stresses – principle of effective stress – quick sand condition – Introduction to Seepage through soils – Flow nets – Characteristics and Uses of flow nets.

UNIT – III

Compaction: Mechanism of compaction – factors affecting compaction – effects of compaction on soil properties – Field compaction Equipment – compaction quality control.

Stress distribution in soils: Boussinesq's and Westergaard's theories for point loads ,uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under a point load along the vertical and horizontal plane.

UNIT – IV

Consolidation: Types of compressibility – immediate settlement, primary consolidation and Secondary consolidation – stress history of clay; e-p and e-log-p curves – normal consolidation soil, over consolidated soil and under consolidated soil – pre-consolidation Pressure and its determination – Terzaghi's 1-D consolidation theory.

UNIT – V

Shear strength of soils: Introduction of shear strength – Mohr - Coulomb Failure theories – Types of laboratory strength tests – Direct Shear test, Vane shear test – strength tests based on drainage conditions – Tri-Axial test strength envelops – Shear strength of sands – dilatancy, Critical void ratio – Concept of liquefaction.

Text Books:

1. Soil Mechanics and Foundation Engineeringg, Dr. K.R Arora, Standard Publishers and Distributors, Delhi, 7th Edition, 2010

Reference Books:

1. Principles of Foundation Engineering, Braja M. Das, Cengage Learning, 7th Edition, 2011
2. Basic and applied soil mechanics, Gopal Ranjan & ASR Rao, New Age International Pvt ltd, New Delhi, 3rd Edition, 2016

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DESIGN OF REINFORCED CONCRETE STRUCTURES

B.Tech III Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course outcome

After completion of this course students will be able to

CO1: Understand the various design concepts and design a beam under flexure and draw the reinforcement details.

CO2: Design the beam under shear and torsion, Calculate the anchorage and development length and check the serviceability requirements for RC structural elements.

CO3: Analyze and solve various RC slabs and draw the reinforcement details

CO4: Classify short, long columns and draw the reinforcement details

CO5: Explore the design concept of footing & staircase

UNIT – I

Concepts of RC design: Introduction- Structure – Components of structure - Different types of structures - Loads Different types of Loads – Dead Load, Live Load, Earthquake Load and Wind Load - Working stress method Ultimate load method – Limit State method – Stress-strain curve for concrete, steel – Partial safety factor Characteristic values – Stress Block parameters – IS: 456-2000 provisions.

Design and detailing of beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – II

Shear, torsion and bond: Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, IS Code provisions. Design examples in simply supported and continuous beams, detailing. Limit state of serviceability for deflection and cracking – IS Code provisions.

UNIT – III

Design and detailing of slabs: Design of one way, two way and continuous slabs using IS Codal provisions and coefficients. Cantilever slab / Canopy slab. Introduction to Yield line theory.

UNIT – IV

Design and detailing of short and long columns: Subjected to axial loads, uniaxial and biaxial bending – IS Code provisions.

UNIT – V

Design and detailing of footings and staircase: Different types of footings – Design of isolated, square, rectangular and circular footings – Introduction to combined footings. Design of staircase (dog-legged type)

Text Books:

1. Limit state design of reinforced concrete, Dr. B. C. Punmia, and A. K. Jain, Laxmi Publications, 2nd Edition,2016.

Reference Books:

1. Fundamentals of Reinforced Concrete design, M.L Ghambhir, Prentice Hall of India,5th Edition, 2011.
2. Plain and Reinforced Concrete (Vol. I), Jain & Jai krishna, Nemchand Brother, 8th Edition, 2012.

IS Code

1. IS: 456-2000 Indian Standard plain and reinforced concrete - code of practice (Fourth Revision) Tenth Reprint APRIL 2007

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2. SP16, Design Aids for Reinforced Concrete to IS 456: 1978

Note : IS: 456 2000 and SP16 need to be provided during examination

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ADVANCED STRUCTURAL ANALYSIS (PE I)

B Tech III Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

CO1: Analyze the continuous beams, portal frames by Kani's method

CO2: Demonstrate the Indeterminacy of Trusses by Castigliano's second theorem

CO3: Evaluate the shear forces and bending moments in Two-Hinged arches and to execute secondary stresses due to rise of temperature and Elastic Shortening of rib

CO4: Analyze the Multi-storey frames by approximate methods for gravity (vertical) and horizontal loads

CO5: Understand the concepts of Matrix method for the analysis of continuous beams and Pin jointed plane frames

UNIT – I

Kani's method: Analysis of continuous beams and portal frames including side sway due to unsymmetrical vertical loading

UNIT – II

Indeterminate Trusses: Analysis of trusses having single and two degrees of internal and external indeterminacies Castigliano's second theorem

UNIT – III

Two hinged arches: Introduction – classification of two hinged arches – analysis of two hinged parabolic arches, analysis of circular arches – secondary stresses in two hinged arches due to temperature and elastic shortening of rib

UNIT – IV

Approximate methods of analysis: Introduction – Analysis of multi – storey frames for lateral loads: Portal Method, Cantilever Method. Analysis of multi storey frames for gravity (vertical) loads. Substitute frame method.

UNIT – V

Matrix Methods of Analysis: Introduction – Static and Kinematic Indeterminacy – Stiffness method - Analysis of continuous beams including settlement of supports – Analysis of pin-jointed determinate plane frames – Analysis of single bay single storey frames, including side sway.

Flexibility method – Analysis of continuous beams up to three degrees of the indeterminacy.

Text Books:

1. Theory of Structures, S. Ramamrutham, Dhanpat Rai Publishing Company, 9th Edition, 2015.
2. Structual Analysis-II, S.S Bhavikatti, Vikas Publishing house pvt Ltd, 4th Edition, 2011.

Reference Books:

1. Analysis of Structures (Vol. I and II), Vazrani, M.M Ratwani and S.K Duggal, Khanna publishers, 2009.

1. 2. 3. 4. 5.

6. 7. 8. 9.

BUILDING PLANNING & DRAWING (PE I)

B.Tech III Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course outcomes

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

CO1: Identify various building components, conventional signs and symbols

CO2: Illustrate the building bye laws and the principles of planning

CO3: Compute the building services and safety aspects

CO4: Design and draft the plans of various types of buildings and detailing of doors, windows

CO5: Understand the elements of perspective drawing involving simple problems

UNIT – I

Basic components of buildings: Design of various elements of building like various types of footing, open foundation, raft, grillage, pile and well foundation, drawing of frames of doors or windows, various types of door, window, and ventilators, lintels and arches, stairs and staircase, trusses, flooring, roofs etc

Drawing practice: Sketches of various building components, one drawing sheet of various building components like doors, windows, lintels and arches, stairs foundation etc

UNIT – II

Building planning: provision on national building code, building bye-laws, open area, setbacks, FAR terminology, principles of architectural composition (ie. Unity, contrast etc), principles of planning orientation

Drawing practice: one drawing sheet each of services and interiors of buildings.

UNIT – III

Building Services - Introduction of building services like water supply and drainage, electrification, ventilation and lighting and staircases, fire safety, thermal insulation, acoustics of buildings

Drawing practice: Detailed planning of one two bedroom residential building (One drawing sheet)

UNIT – IV

Design and Drawing of Building: Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, detailing of doors , windows, ventilators and staircases

Drawing practice: Residential building, Institutional buildings (One drawing sheet each)

UNIT – V

Perspective Drawing: Elements of Perspective Drawing involving simple problems, one point and two point Perspectives, principles of energy efficient buildings

Drawing practice: One drawing sheet on each one point and two point Perspectives problem

NOTE:

Four periods per week of drawing class should be conducted. The end examination paper should consist of Part – A and Part – B. Part – A should consist of eleven questions on the syllabus while Part – B should consist of 4 questions on drawing out of which 2 to be answered. Weightage for Part – A is 60 % and Part – B is 40 %. In exam drawing board should be provided.

Text Books:

1. Building Planning and Drawing, N Kumar swamy and Kameswar Rao, charator pubications, 7th Edition, 2015.

1. 2. 3. 4. 5.

6. 7. 8. 9.

2. Building planning, Design and scheduling, Gurucharan Singh Jagdish Singh, 2nd Edition, 2008.

Reference Books:

1. Civil Engineering Drawing, B N Ghose, CBS Publication, 2nd Edition, 2010.
2. Building drawing with an integrated approach to built environment , M G Shah, C M Kale & S Y Patki, Mc Graw hil Education, 5th Edition, 2002.

1. 2. 3. 4. 5.

6. 7. 8. 9.

AIR POLLUTION AND CONTROL METHODS (PE1)

B. Tech III Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

CO1: Find the sources, causes & effects of air pollution.

CO2: Understand the meteorological components and the plume behavior for atmospheric stability conditions.

CO3: Identify the types of equipments to control the particulates at sources.

CO4: Minimize the control measures of NOX, SOX and other gaseous emissions.

CO5: Demonstrate the factors for siting an industry by examining the air quality standards.

UNIT – I

Air Pollution: Definitions, Air Pollution Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources. Effects of Airpollutants on man, material and vegetation; Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc

UNIT – II

Meteorology: plume Dispersion; properties of the atmosphere, Heat, Pressure, Wind forces, Moisture and relative Humidity, Significance of various meteorological parameters in air pollution, wind rose diagrams, Lapse Rates, Pressure Systems.

UNIT – III

Control of particulates – Control at Sources-Raw material changes, Process Changes, Equipment modifications or replacement, Equipment's – Settling Chambers, Centrifugal separators or cyclones, , Fabric filters, Electrostatic precipitator and Wet scrubbers.

UNIT – IV

Control of gaseous emissions: Adsorption, Absorption, Combustion, Sox Control technology- Natural dispersion by dilution, Using alternate fuels, removal of sulphur from fuels(Desulfurization),NOx Control technology- NOx control by modification of operating and design conditions- Low Excess air combustion, Decreasing Combustion air temperature, Two stage combustion, Flue gas recirculation.

UNIT – V

Air Pollution Monitoring and management: Environmental guidelines for siting of industries, Environmental impact assessment, Stack emission standards Ambient air quality standards, air pollution control act, Ambient air quality monitoring- location of stations, Duration of sampling period, SPM sampling, Gaseous sampling.

Text Books:

1. Air pollution and Control, K.V.S.G. Murali Krishna, Laxmi Publications, 1st Edition, 2015.

Reference Books:

1. An introduction to air pollution, R.K. Trivedy and P.K. Goel, B.S publications, 2nd Edition,1986.
2. Environmental pollution control engineering, C.S. Rao, New Age International, 2nd Edition, 2006.

1. 2. 3. 4. 5.

6. 7. 8. 9.

GEOTECHNICAL ENGINEERING LAB

L	T	P	C
0	0	2	1

B.Tech III Year I Semester – CIVIL

Course Outcomes

After completion of this course students will be able to

CO1. Demonstrate the engineering properties the soil.

CO2. Illustrate the field bulk and dry density of cohesive and cohesion less soils.

CO3. Classify the Coarse grained soils based on sieve analysis test & a grain size distribution curve.

CO4: Compute the shear strength of cohesive and cohesion less soil.

CO5. Determine the permeability of coarse grained soil and fine grained soil by constant head permeability test and falling head method.

List of Experiments

1. Atterberg's limits
2. Field density- core cutter and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant head test.
5. Permeability of soil variable head test.
6. Compaction test
7. C.B.R test
8. Consolidation test
9. Unconfined compression test
10. Triaxial compression test
11. Direct shear test
12. Vane shear test.

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FLUID MECHANICS & HYDRAULIC MACHINERY LAB

B Tech III Year I Semester – CIVIL

L	T	P	C
0	0	2	1

Course Outcomes

After completion of this course students will be able to

CO1: Examine the calibration of different flow meters

CO2: Illustrate flow measuring devices used in pipes, channels and notches

CO3: Determine major and minor losses in pipes

CO4: Analyse the energy equation for problems in pipe flow

CO5: Examine the performance characteristics of turbines and pumps

List of experiments

1. Calibration of Venture meter and Orifice meter
2. Determination of coefficient of discharge for a small orifice/mouthpiece by constant head method
3. Calibration of contracted rectangular notch and triangular notch
4. Determination of friction factor of a pipe
5. Determination of coefficient for minor losses.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of hydraulic jump
9. Performance test on Pelton wheel turbine
10. Performance test on Kaplan Turbine
11. Performance characteristics of a single stage /multi stage centrifugal pump
12. Performance characteristics of a reciprocating pump

B. Tech. III Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	PC - 11	Highway Engineering	3	0	0	3
2	PC - 12	Foundation Engineering	3	0	0	3
3	PC - 13	Environmental Engineering	3	0	0	3
4	PC - 14	Water Resources Engineering	3	0	0	3
5	PE - 2	1. Construction Engineering& Management 2. Ground Improvement Techniques 3. Finite Element Method	3	0	0	3
6	OE - 2	Open Elective	3	0	0	3
7	PC Lab - 6	Environmental Engineering Lab	0	0	2	1
8	H&S Lab- 3	Advanced Communication Skills Lab	0	0	2	1
9	ES - 7	Quantitative Methods & Logical Reasoning	2	0	0	1
		Total	**20**	**0**	**4**	**21**

1. 2. 3. 4. 5.

6. 7. 8. 9.

HIGHWAY ENGINEERING

B.Tech III Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Summarize the road developments in India from different periods

CO2: Apply the concept of geometric design in real time engineering

CO3: Make use of parameters related to traffic studies

CO4: Design & model the intersections with specific standards

CO5: Evaluate the different pavement design methods using IRC standards

UNIT- I

Highway development and planning: Highway Development in India – Necessity for Highway Planning- Different Road Development Plans; Classification of Roads - Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports – Highway Project.

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 & regulations: Basic Parameters of Traffic-Volume, Speed and Density - Traffic Volume Studies - Data Collection and Presentation – Speed studies – Data Collection and Presentation - Origin & Destination studies, Parking Studies – On street& Off street Parking - Road Accidents - Causes and Preventive Measures – Accident Data Recording – Condition Diagram and Collision Diagrams – Traffic Signs – Types and Specifications – Road Markings - Need for Road Markings-Types of Road Markings - Design of Traffic Signals – Webster Method.

UNIT- IV

Intersection design: Types of Intersections – Conflicts at Intersections – Requirements of At-Grade Intersections - Types of At-Grade Intersections: Channelized and Unchannelized Intersections – Traffic Islands - Types of Grade Separated Intersections - Rotary Intersection – Concept of Rotary – Design Factors of Rotary – Advantages and Limitations of Rotary Intersections.

UNIT -V

Pavement Design: Factors affecting design, Highway Materials Introduction, Characteristics of highway materials, Design of Pavements- Design of Flexible pavement by CBR method as per IRC 37-2012 and theory of empirical mechanistic method. Design of rigid pavements as per IRC 58-2015,Stresses in rigid pavement by westergards and IRC methods.

Text Books:

1. Highway Engineering, S K Khanna & C.E.G. Justo, Nemchand & Bros., 7th Edition, 2000.

Reference Books:

1. Principles of Traffic and Highway Engineering, Nicholas J. Garber & Lester A. Hoel, Cengage Learning, 5th Edition.
2. Principles and Practices of Highway Engineering, Dr. L.R. Kadiyali and Dr. N. Lal, Khanna Publications,1st Edition, 2005
3. Traffic Engineering & Transportation Planning, Dr. L. R. Kadiyali, Khanna Publications, 6th Edition, 1997.

1. 2. 3. 4. 5.

6. 7. 8. 9. K Devi

FOUNDATION ENGINEERING

B.Tech III Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

CO1: Organize the preparation and programme of soil investigation

CO2: Examine the earth pressure theories and stability of retaining walls.

CO3: Evaluate the bearing capacity of soil and allowable settlement

CO4: Analyse the capacity and settlement of pile foundation.

CO5: Analyse the stability of finite and infinite slopes using various methods.

UNIT – I

Soil Exploration: Need – methods of soil exploration – boring and sampling methods – penetration tests – plate load test – pressure meter – planning of soil exploration programme and preparation of soil investigation report.

UNIT – II

Earth pressure theories: Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory.

Retaining walls: Types of retaining walls – stability of gravity and cantilever retaining walls against overturning, sliding and, bearing capacity. Drainage from backfill, introduction to reinforced earth walls.

UNIT – III

Bearing capacity and settlement foundation: Types – choice of foundation – location and depth – safe bearing capacity – Terzaghi, Mayerhof, Skempton and IS methods. Safe bearing pressure based on SPT N – value- Allowable bearing pressure; safe bearing capacity- allowable settlement of structures and plate load test – allowable settlements of structures.

UNIT – IV

pile foundation: Types of piles – load carrying capacity of piles based on static pile formulae – dynamic pile formulae – Pile Capacity through SPT and CPT results – pile load tests – load carrying capacity of pile groups in sands and clays – Settlement of pile groups – negative skin friction.

UNIT – V

Slope stability: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish slip circle method, method of slices, Bishop's Simplified method of slices – Taylor's Stability Number- stability of slopes.

Text books

1. Soil Mechanics And Foundation Engineering , K.R. Arora, Standard publishers,7th Edition, 2010.

References

1. Principles of Foundation Engineering, Braja M. Das, Cengage Learning, 7th Edition, 2011.

1. 2. 3. 4. 5.

6. 7. 8. 9.

ENVIRONMENTAL ENGINEERING

B Tech III Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Predict the population by different methods

CO2: Design the filter and settling tanks for water treatment

CO3: Examine the characteristics of sewage

CO4: Analyse and design the sewers for sewerage system

CO5: Design different units of sewage treatment plant

UNIT – I

Introduction: Waterborne diseases – protected water supply – Population forecasts, design period – types of water demand – factors affecting – fluctuations – fire demand – water quality and testing – drinking water standards, sources of water – Comparison from quality, quantity and other considerations – intakes – infiltration galleries.

UNIT – II

Layout and general outline of water treatment units: sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants – feeding arrangements, Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation - comparison of filters – disinfection – theory of chlorination, chlorine demand - other disinfection practices- Miscellaneous treatment methods.

UNIT – III

Water distribution systems: Types of layouts of distribution system- design of distribution system- Hardy cross and equivalent pipe methods – service reservoirs – determination of storage capacity. Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows, combined flow – characteristics of sewage – examination of sewage – B O D – C O D equations.

UNIT – IV

Design of sewers: Hydraulic formulae. Maximum and minimum velocities in sewer. Differences in the design of water supply pipes and sewer pipes, Shapes and materials – sewer appurtenances manholes – inverted siphon – catch basins – flushing tanks – ejectors, pumps and pump houses – house drainage – components requirements – sanitary fitting traps- one pipe and two pipe systems of plumbing.

UNIT –V

Design of different units: primary sedimentation tank – design of screens – grit chambers – principles and design of biological treatment – trickling filters, activated sludge process, oxidation ditches.

Text books

1. Water Supply Engineering (Vol. II), B.C. Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt. Ltd, 2nd Edition, 2016.
2. Waste water Engineering (Vol. III), B.C. Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt. Ltd, 2nd Edition, New Delhi, 2016.

Reference

1. Sewage Disposal and Air Pollution Engineering – Santhosh kumargang, Khanna Publications, 24th Edition, 2012.
2. Water Supply and Sanitary Engineering, G.S. Birdie, Dhanpat Rai Publishing Company, 9th Edition,2011.

1. 2. 3. 4. 5.

6. 7. 8. 9.

WATER RESOURCES ENGINEERING

B.Tech III Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

CO1 Describe the components in the hydrologic cycle and interaction among various processes in the hydrologic cycle

CO2 Analyse the flood and its measurement by means of hydrograph

CO3 Analyse the phenomenon of ground water occurrence by means of aquifers

CO4 Assess the methods of irrigation and its quality with the help of duty delta relationship

CO5 Design the canals by using standard theories

UNIT - I

Introduction to engineering hydrology and its applications: hydrologic cycle, Types and forms of precipitation, Rainfall Measurement, Different types of rain gauges, rainfall measurement, computation of average rainfall over a basin, processing of rainfall data- Adjustment of record – rainfall double mass curve. Runoff- factors affecting runoff- runoff over a catchment – Empirical and rational formulae.

Abstraction from rainfall- evaporation, factors affecting evaporation, measurement of evaporation- evapotranspiration- penman and balney & creeddle methods- infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

UNIT - II

Flood measurement and analysis: Distribution of runoff – Hydrograph analysis flood hydrograph- effective rainfall- base flow-base flow separation- direct runoff hydrograph-Unit Hydrograph, definition and limitations of applications of unit hydrograph, derivation of unit hydrograph from direct runoff hydrograph and vice versa- S- Hydrograph. Synthetic unit hydrograph.

UNIT - III

Ground water occurrence: types of aquifers, Aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient. Darcy's law. Steady radial flow to wells in confined and unconfined aquifer. Types of wells – Well construction- well development.

UNIT - IV

Necessity and importance of irrigation: Types of irrigation, advantages and ill effects of irrigation,. Indian agricultural soils, Rabi and Kharip seasons, methods of improving soil fertility- crop rotation, preparation of land for irrigation, standards of quality for Irrigation water, crop period, base period, kor period, Duty and delta, factors affecting duty, efficiencies. Water Logging.

UNIT V

Canals and its design: Classification of canals. Design of Irrigation canals by Kennedy's and Lacey's theories. balancing depth of cutting, IS standards for a canal design, canal lining.

Certain important definitions. GCA, CCA, intensity of irrigation, Design capacity of an irrigation canal, Computation of design capacity. Stream Gauging – measurement and estimation of stream flow.

Text Books:

1. Engineering Hydrology, Jayaram Reddy, Laxmi publications pvt. Ltd., 3rd Edition, 2016.
2. Irrigation and Hydraulic structures, S.K. Grag, Khanna Publishers, 21st Edition. 2009.

Reference Books:

1. Irrigation and water power engineering, B. C. Punmia, P.B.B.Lal, A.K. Jain & A.K. Jain, Laxmi publications pvt. Ltd., 16th Edition, 2014.

1 2 3 4 5

6 7 8 9

CONSTRUCTION ENGINEERING & MANAGEMENT (PE 2)

B.Tech III Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Understand the behavioural aspect of entrepreneurs, various approaches of time management, their strength and weakness.

CO2: Apply the concepts of project management Techniques.

CO3: Analysis various materials and equipments for construction work.

CO4: Examine on different types of contracts and specifications.

CO5: Outline the labour regulations and safety in construction.

UNIT – I

Management Techniques: Roles, Management theories, Social responsibilities, planning and strategic management, Strategy implementation, Decision making tools and techniques – Organizational structure, Human resource management – motivation performance – leadership.

UNIT – II

Management Applications: Classification of Construction projects, Construction stages, Resources – Functions of Construction Management and its Applications: Preliminary Planning – Collection of Data – Contract Planning – Scientific Methods of Management: Network Techniques in construction management – Bar chart, Gant chart, CPM, PERT, Cost & Time optimization.

UNIT – III

Resource Management: Resource planning – planning for manpower, materials, costs, equipment. Labour, Scheduling, Forms of scheduling – Resource allocation, Budget and budgetary control methods.

UNIT – IV

Contracts and Tenders: Contract – types of contract, contract document, specification, important conditions of contract – tender and tender document – Deposits by the contractor – Arbitration, Negotiation – M.Book – Muster roll – stores.

UNIT – V

Management Information System: Labour Regulations: Social Security – welfare Legislation – Laws relating to Wages, Bonus and Industrial disputes, Labour Administration – Insurance and Safety Regulations, Workmen's Compensation Act – other labour Laws – Safety in construction, legal and financial aspects of accidents in construction, occupational and safety hazard assessment, Human factors in safety.

Text Books:

1. Construction Planning and Management, P.S. Gahlot & B.M. Dhir, Wiley Eastern Limited, 2nd Edition,2018.
2. Construction Project Management, Chitkara K.K, Tata McGraw Hill Publishing Co, 4th Edition, 2019.
3. Management Theory and practice, VSP Rao, Excel Books, 2008.

Reference Books:

1. Estimation, costing, specification and valuation in civil engineering, M. Chakraborti, 18th Edition, 2006.

1. 2. 3. 4. 5.

6. 7. 8. 9. K Devi

GROUND IMPROVEMENT TECHNIQUES (PE-2)

B.Tech III Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

CO1: Discuss the several Ground modification mechanisms

CO2: Illustrate the Ground Improvement Techniques through mechanical approach

CO3: Identify the different Hydraulic ground improvement techniques through dewatering techniques

CO4: Explain the quick settlement techniques through chemical and physical modification

CO5: Distinguish the inclusion and confinement techniques of ground improvement

UNIT - I

Introduction to engineering ground modification: Need for Ground Improvement Techniques, Traditional Objectives and Emerging Trends, Identification of soil types, In situ and laboratory tests to characterize problematic soils, Classification of Ground Improvement techniques, Suitability, Feasibility and Desirability

UNIT - II

Mechanical Modification: Principles of soil densification – Moisture Content, Compactive Effort, Soil type and Preparation, Properties of Compacted soil, Compaction control tests, Specification of compaction requirements in terms of water content and Density, Blasting, Vibrocompaction, Dynamic Tamping and Compaction piles

UNIT - III

Hydraulic Modification: Objectives and techniques, Methods of de-watering – sumps and interceptor ditches – single, multi stage well points, vacuum well points, Horizontal wells, Electro-osmosis, Filtration, Drainage and seepage control with Geosynthetics, Preloading and vertical drains, Electro-kinetic dewatering

UNIT - IV

Physical and Chemical Modification: Methods of stabilization: cement, lime, bituminous, chemical stabilization with calcium chloride, sodium silicate and gypsum, Sintering and Grouting Technology, Modification at depth by grouting, Crack Grouting and compaction grouting, Jet grouting, Thermal Modification, Ground freezing

UNIT - V

Modification by Inclusions and Confinement: Soil Reinforcement, Reinforcement with strip, bar, mesh, sheet and grid reinforced soil, In situ ground reinforcement, Ground Anchors, Types of ground anchors, Rock bolting and Soil nailing

Text Books

1. Engineering Principles of Ground Modifications, Hausmann M. R., McGraw Hill publication, Indian Edition, 1990.
2. Ground Improvement Techniques, Dr. P. Purushothama Raj, Laxmi publication, 3rd Edition, 2016

References Books

1. Designing with Geosynthetics, Koerner R. M., Prentice Hall, New Jersey 5th Edition, 1994
2. Earth Reinforcement and soil structures, Jones C. J. F. P., Butterworths, London, revised subsequent Edition 2013

FINITE ELEMENT METHOD (PE2)

B Tech III Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcome

Upon successful completion of this course students will be able to

CO1: Explain plane stress-plane strain equations and develop displacement functions

CO2: Analyze one-dimensional problems using stiffness matrix

CO3: Examine the different elements based on continuity and compatibility

CO4: Illustrate quadrilateral elements using nodal points and shape functions.

CO5: Discuss the solution techniques for static condition

UNIT – I

Introduction to Finite Element Method: Basic Equations in Elasticity Coordinate system – Natural, Global Coordinate System Coordinates. Stress – Strain equation – concept of plane stress – plane strain advantages and disadvantages of FEM. Element shapes – nodes – nodal degree of freedom – strain displacement relations.

UNIT – II

One dimensional problem: Bar element – Shape functions, stiffness matrix Strain displacement matrix formulation. FEA Beam elements – stiffness matrix – shape function – Analysis of continuous beams – stress strain relation.

UNIT – III

Two dimensional problems: FEA Two dimensional problem – CST – LST element – shape function – stress – strain Relation, Lagrangian – serendipity elements – Hermite polynomials – regular, Irregular 2 D & 3D – Element – shape functions.

UNIT – IV

Isoparametric formulation: Concepts of isoparametric elements for 2D analysis – 4 noded and 8 noded iso- parametric quadrilateral elements.

UNIT – V

Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Text Book:

1. Introduction to finite Elements in Engineering, Tirupathi R. Chandrupatla and Ashok D. Belegundu, Prentice Hall of India, 4th Edition, 2012.

Reference Book:

1. Finite Element Analysis, P. Seshu, PHI Learning Private Limited, 10th Edition ,2012.
2. Concepts and applications of Finite Element Analysis, Robert D & Cook et al., Wiley India Pvt. Ltd. 3rd Edition, 1988.

1. 2. 3. 4. 5.

6. 7. 8. 9. K Das

ENVIRONMENTAL ENGINEERING LAB

B Tech III Year II Semester – CIVIL

L	T	P	C
0	0	2	1

Course outcomes

After completion of this course students will be able to

CO1: Understand principles and their practical application in water treatment

CO2: Determine physical, chemical and biological characteristics of water and wastewater

CO3: Determine the optimum dose of coagulant

CO4: Estimate the chloride, nitrate and iron content in water

CO5: Summarize the solutions using titration, conductivity meter, pH meter, turbidity meter and DO meter

List of experiments

1. Determination of pH and turbidity
2. Determination of Conductivity and total dissolved solids
3. Determination of Alkalinity and Acidity
4. Determination of Chlorides
5. Determination of Iron
6. Determination of Dissolved Oxygen
7. Determination of Nitrates
8. Determination of Optimum dose of Coagulant
9. Determination of Chlorine Demand
10. Determination of B.O.D
11. Determination of C.O.D
12. Presumptive Coliform test

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B. Tech. IV Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	PC – 15	Design of Steel Structures	3	0	0	3
2	PC – 16	Estimation & Costing	3	0	0	3
3	PE – 3	1. Prestressed Concrete Structure 2. Earthquake Engineering 3. Green Building Technologies	3	0	0	3
4	PE – 4	1. Railway Airport and Harbour Engineering 2. Advanced Structural Design 3. Ground water Hydrology	3	0	0	3
5	OE – 3	Open Elective	3	0	0	3
6	PC Lab – 7	Concrete & Highway Materials Lab	0	0	2	1
7	PC Lab – 8	Computational Lab	0	0	2	1
8	PW-1	Industry Oriented Mini Project	0	0	0	3
		Total	**15**	**0**	**4**	**20**

DESIGN OF STEEL STRUCTURES

B.Tech III Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

- CO1: Classify the types of connections and specifications as per IS: 800-2007.
- CO2: Apply the provisions of IS: 800-2007 to design tension members.
- CO3: Analyze and design compression members.
- CO4: Illustrate behavior of beams and design strengths as per IS code.
- CO5: Adapt IS code procedures to design welded plate girder.

UNIT – I

Theory and introduction: Materials – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads – and combinations. local buckling behavior of steel. Concept of limit State Design – Limit States – Design Strengths- deflection limits – serviceability – stability check. Bolted connections – Riveted connections – IS – 800 – 2007 - specifications. Design strength – efficiency of joint – prying action. Welded connections – Types of welded joints – specifications - design requirements.

UNIT – II

Design of tension members: Design strength – Design procedure – Design of Tension member – Design procedure – splice – lug angle.

UNIT – III

Design of compression members: Design of compression members – Buckling class – slenderness ratio – strength – design – laced – battened columns.

UNIT – IV

Design of Beams: Design of Beams – Plastic moment – Bending and shear strength / buckling – Built-up sections – laterally – supported beams – Web Buckling and Web Crippling strength.

UNIT – V

Design of Welded Plate girders – elements – economical depth – design of main section – connections between web and flange – design of end bearing stiffenersand intermediate stiffeners.

Text Books:

1. Design of steel structures, N. Subramanian, Oxford University Press, 1st Edition, 2009.
2. Design of steel structures, S. K. Duggal, Tata McGraw-Hill Education, 2nd Edition 2010.

Reference Books:

1. Design of Steel Structures, Edwin H. Gaylord, Jr. Charles N. Gaylord and James Stallmeyer, Tata McGraw-Hill Education pvt. Ltd.,3rd Edition, 2012.

IS Codes

1. *IS: 800 – 2007 General construction in steel – code of practice 3rd Edition.*
2. *IS: 875 Part III 2000 Code of practice for design loads for buildings and structures (second Edition)*

Note:IS: 800–2007, IS 875 are permitted during the examination

1. 2. 3. 4. 5.

6. 7. 8. 9.

ESTIMATION & COSTING

B Tech IV Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcome

After completion of this course students will be able to

CO1: Summarize the basic principles and standard methods for working out quantities in estimating.

CO2: Determine the earthwork estimate of buildings, roads and canals.

CO3: Estimate the rate analysis of the various items of work.

CO4: Understand the process of contracting for roads and buildings.

CO5: Evaluate the valuation of buildings and provide practical knowledge of standard specifications of items of building construction.

UNIT – I

Introduction: General items of work in Building, Standard Unit Principles of working out quantities for detailed and abstract estimates – Approximate and Detailed Estimate of Buildings. Principles of bar bending (introduction)

UNIT – II

Earthwork Estimation: Methods of estimation of buildings and roads. Canals in cutting.

UNIT – III

Rate Analysis: Unit rate analysis for various items of building works.

UNIT – IV

Contracts: Contracts – Types of contracts – Contract Documents – Conditions of contract.

UNIT – V

Valuation of buildings: Standard specifications for different items of building construction.

Text Books:

1. Estimating and Costing, B.N. Dutta, UBS publishers, 27th Edition, 2016.

Reference Books:

1. Estimation, Costing and Specifications, M. Chakraborthi, Laxmi publications, 24th Edition, 2006.
2. Standard schedule of rates and standard data book, public works department.

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6. 7. 8. 9. K Devi

PRESTRESSED CONCRETE STRUCTURES (PE3)

B.Tech IV Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of these course students will be able to

CO1: Classify the concepts, principles, types and methods of PSC structures.

CO2: Evaluate the losses of PSC structures.

CO3: Analysis and design of PSC slabs and beams using IS 1343 (2012).

CO4: Explain transmission of prestressing force, end block analysis by different methods.

CO5: Analyse the stress distribution of composite beams and asses the deflection of beams. Understand the different methods of prestressing.

UNIT – I

Introduction: Historic development- General principles of prestressing pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC – Classification and types of prestressing- Materials- high strength concrete and high tensile steel their characteristics.

Methods and Systems of pre stressing: Pretensioning and Post tensioning methodsand systems of prestressing like Hoyer system, MagnelBlaton system, Freyssinet system and Gifford- Udall System- Lee McCall system.

UNIT – II

Losses of Prestress: Loss of prestress in pretensioned and posttensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.

UNIT – III

Flexure: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of PSC slabs and beams of rectangular and I sections.

Shear: General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear – Design of shear reinforcements- IS Code provisions.

UNIT – IV

Transfer of Prestress in Pretensioned Members : Transmission of prestressing force by bond – Transmission length – Flexural bond stresses – IS code provisions – Anchorage zone stresses in post tensioned members – stress distribution in end block – Analysis by Guyon, Magnel, Zienkinski and Rowe's methods – Anchorage zone reinforcement- IS Provisions.

UNIT – V

Composite Beams: Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.

Deflections: Importance of control of deflections- Factors influencing deflections – Short term deflections of uncracked beams- prediction of long time deflections- IS code requirements.

Text Books

1. Prestressed concrete, N. Krishna Raju, Tata Mc Graw Hill Book Education pvt.ltd, 5th Edition, 2010.
2. Prestressed Concrete, N. Rajagopalan, Narosa Publishing House, 1st Edition,2014.

Reference Books:

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1. Design of prestress concrete structures, T. Y. Lin and Burns, John Wiley, New York, 3rd Edition, 2003.
2. Prestressed concrete, S. Ramamrutham, Dhanpat R.s. & Sons, Delhi, 1st Edition, 2018.

EARTHQUAKE ENGINEERING (PE3)

B.Tech IV Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1. Quantify mechanical behaviour of earth's surface, seismic hazards and its effects

CO2. Identify, formulate and solves engineering problems subjected to dynamic loading conditions.

CO3. Understand the internal parameters of the structures for seismic design source.

CO4. Assess the design component or process to meet desired needs within realistic constraints.

CO5. Analyze and design the members for earthquake resisting parameters.

UNIT – I

Engineering Seismology: Earthquake phenomenon cause of earthquakes – Faults – Plate tectonics – Seismic waves – Terms associated with earthquakes – Magnitude/Intensity of an earthquake – scales – Energy released – Earthquake measuring instruments – Seismoscope, Seismograph, accelerograph – strong ground motions – Seismic zones of India.

UNIT – II

Theory of Vibrations: Elements of a vibratory system – Degrees of Freedom – Continuous system – Lumped mass idealization – Oscillatory motion – Simple Harmonic Motion – Free vibration of single degree of freedom (SDOF) system – undamped and damped – critical damping – Logarithmic decrement – Forced vibrations – Harmonic excitation – Dynamic magnification factor – Excitation by rigid based translation for SDOF system – Earthquake ground motion.

UNIT – III

Conceptual design: Building configurations – Introduction – Functional planning – Continuous load path – Overall form – simplicity and symmetry – elongated shapes – stiffness and strength – Horizontal and Vertical members – Twisting of buildings – Ductility – definition – ductility relationships – flexible buildings – framing systems – choice of construction materials – unconfined concrete – confined concrete – masonry – reinforcing steel.

UNIT – IV

Introduction to earthquake resistant design: Seismic design requirements – regular and irregular configurations – basic assumptions – design earthquake loads – basic load combinations – permissible stresses – seismic methods of analysis – factors in seismic analysis – equivalent lateral force method.

UNIT – V

Seismic Analysis of structures: Principles of earthquake resistant design of RC members – Structural – models for frame buildings – Equivalent static analysis of any typical structure.

Text Books:

1. Earthquake Resistant Design of structures, S. K. Duggal, Oxford University Press, 2nd Edition, 2007.
2. Earthquake Resistant Design of structures, Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd, 1st Edition,2016.

Reference Books:

1. Seismic Design of Reinforced Concrete and Masonry Building, T. Paulay and M.J.N. Priestly, John Wiley & Sons, 1st Edition, 1994.
2. Earthquake Resistant Design of Buidling structures, Vinod Hosur, Wiley India Pvt. Ltd, 3rd Edition, 1992.

IS Codes

1. IS: 1893 (Part-1) -2002. "Criteria for Earthquake Resistant Design of structures." B.I.S., New Delhi.
2. IS:4326-1993, " Earthquake Resistant Design and Construction of Building", Code of Practice B.I.S., New Delhi.
3. IS:13920-1993, " Ductile detailing of concrete structures subjected to seismic force" Guidelines, B.I.S., New Delhi.

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GREEN BUILDING TECHNOLOGIES (PE3)

B Tech IV Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to:

- CO1: Understand the Green building concept and focus on approaches that makes building sustainable.
- CO2: Illustrate Green building assessment and accreditation system.
- CO3: Able to apply low energy building strategies.
- CO4: Design green building to improve sustainability of infrastructure.
- CO5: Classify the economic benefits of green buildings.

UNIT – I

Introduction: The shifting landscape of Green buildings, The driving forces for sustainable construction, Ethics and sustainability, Basic Concepts and Vocabulary, Major Environmental and resource concerns, International Building Assessment systems.

UNIT – II

The green building assessment system: Structure of the LEED suite of Building rating systems, LEED Credentials, LEED Building Design and construction Rating system, Green Globes Building Rating Tools, Structure of Green Globes for New Construction, Green Globes Assessment and Certification Process, Green Globes Professional Credentials, IGBC Building design, Rating system and Professional crentials, Green Building Documentation Requirements.

UNIT – III

Green building design: Conventional versus Green Building Systems, green materials, material selection criteria, Executing the Green Building Project, Integrated Design Process, Role of the charrette in the design process.

UNIT – IV

Low – energy building strategies: Building Energy Issues, High – Performance Building Energy Design Strategy, Passive Design Strategy, Building Envelope, Internal Load Reduction, Smart Buildings and Energy Management Systems.

UNIT – V

Green building economics and sustainable construction: General approach, The Business Case for High – Performance Green Buildings, Economics of Green Building, Quantifying Green Building Benefits, Articulating Performance Goals for Future Green Buildings.

Text Books:

1. Sustainable Construction, Charles J. Kibert, John Wiley & sons, 4th Edition, 2016.
2. Sun, Wind & Light: Architectural design strategies, Mark Dekay & G Z Brown, John Wiley & sons, 3rd Edition, 2014.

Reference Books:

1. IGBC Reference Manual (2016)

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RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING (PE-I)

B Tech IV Year I Semester : CIVIL

L	T	P	C
3	0	0	3

Course Outcomes:

After completion of this course students will be able to

CO1: Define and understand the various components of railways

CO2: Understand and solve the geometrics elements needed for the design of permanent way

CO3: Define, understand, and design the various components of the airport

CO4: Define, understand the planning and requirements of a harbor

CO5: Improve and Visualize the working of intelligent transportation system

UNIT – I

Introduction to railway : Permanent way components – Cross Section of Permanent Way – Functions of various Components like Rails, Sleepers and Ballast, Gauge – Creep of Rails- Theories related to Creep – Sleeper density

UNIT – II

Geometric design of railway track: Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve, Points and Crossing, Rail Joints & Welding of Joints, Railway station& Yards, Signalizing & interlocking.

UNIT – III

Airport engineering: Airport Site selection – Runway Orientation – Basic Runway Length – Corrections for Elevation – Airport Classification – Runway Geometric design concepts – Factors Controlling Taxiway Layout – Terminal Area – Apron – Hangar – Blast Considerations, Typical Airport Layouts – Wind rose diagram – Runway Lightening system & Marking.

UNIT – IV

Port and harbor engineering: Requirements of Port and Harbour, Classification of Port & Harbour, Features of a Harbour, Planning of Harbour, Breakwaters, Dry docks, Jetties, Aprons, Transit shed and Warehouses, Navigational aids.

UNIT –V

Intelligent transport systems:ITS Definition, Benefits of ITS, user services, Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Introduction to ITS applications.ITS architecture components and standards, Overview of ITS implementations in developed countries.

Text Books:

1. Railways, railway, Airport and Harbour Engineering, K.P. Subramanian, Scitech publication, 1st Edition, 2010.
2. A Text book of Transportation Engineering, S.P. Chandola, S.Chand & Co. Ltd, 1st Edition, 2001.

Reference Books:

1. A Text Book of Railway Engineering, S.C. Saxena and S. Arora, Dhanpatrai and Sons,7th Edition, 2013.
2. Harbour, Dock and Tunnel Engineering, R. Srinivasan, , Charotar publication, 28th Edition, 2016.
3. Transportation Engineering and planning, C. S. Papacostas, P. Prevedouros, 3rd Edition, 2000.
4. Intelligent Transportation system, Pradeep kumar Sarkar, Amit Kumar Jain PHI learning , 1st Edition, 2018.

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ADVANCED STRUCTURAL DESIGN (PE-4)

B Tech IV Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcome

After completion of this course students will be able to

CO1: Analyze and design of cantilever retaining wall.
CO2: Apply the provision of IS: 3370-2009 to design water tank.
CO3: Comesle the design aspects of flat slabs.
CO4: Adapt the provision of IRC: 21-1987 to class AA loading to design T-beam girder.
CO5: Summarize the force components and design principles of RCC Chimney.

UNIT – I

Design of Retaining walls: Types of retaining walls, forces on cantilever retaining wall, stability conditions of a cantilever retaining wall, proportioning of cantilever retaining wall. Introduction to counter fort retaining wall.

UNIT – II

Design of water tank: Design philosophy and requirements, I.S code recommendations regarding, Detailing in water tank. Design of circular water tank resting on ground (approximate method),I.S code method for design of circular tank. Design of elevated tank with staging.

UNIT – III

Design of flat slab: Introduction terminology related with flat slab construction, I.S code provision for flat slab. Analyses and design of flat slab by direct design method. Shear in flat slab, openings in flat slab.

UNIT – IV

Design of concrete bridges: IRC loading. Design of R.C slab culvert. Design of T-beam Girder Bridge.

UNIT – V

Chimneys: Different components of Chimney, Design of RCC chimney.

Text Books:

1. Reinforced Concrete Structures vol II, B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, Lakshmi Publications Pvt. Ltd. 5th Edition, 2015.
2. Reinforced cement concrete design, Neelam Shatnia , S.K. Kataria & sons Publication, revised Edition, 2020.
3. Advanced Reinforced Concrete Structures, N. Krishna Raju., 4th Edition, 2019.

Reference Books:

1. Advanced Reinforced Concrete Structures, Varghese, Prantices hall of India pvt ltd,2nd Edition, 2010.
2. Essentials of Bridge Engineering, DeJohn son Victor, Oxford, and IBM publication co pvt ltd, 6th Edition, 2007.

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6. 7. 8. 9. K Devi

GROUND WATER HYDROLOGY (PE4)

B.Tech IV Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

CO1: Understand different types of aquifers and their characteristics

CO2: Analyse the pumping test data for different aquifers

CO3: Distinguish the surface and subsurface investigation methods of ground water.

CO4: Discuss the methods of artificial recharging of ground water.

CO5: Explain the control of saline water intrusions.

UNIT - I

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention. Ground Water Movement: Permeability, Darcy's law, storage coefficient, Transmissivity, differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system.

UNIT - II

Ground water and well hydraulics: Analysis of Pumping Test Data – I: Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theism's equations. Assumptions, Formation constants, yield of an open well interface and well tests.

UNIT - III

Unsteady flow analysis: Pumping Test Data – II: Unsteady flow towards a well – Non equilibrium Equations – Theis solution – Jacob and Chow's simplifications. Leak aquifers. Surface and Subsurface Investigation: Surface methods of exploration – Electrical resistivity and Seismic Refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

UNIT - IV

Artificial Recharge of Ground Water: Concept of artificial recharge – recharge methods. Relative merits, Applicatsons of GIS and Remote Sensing in Artificial Recharge of Ground Water along with Case studies.

UNIT - V

Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben- Herzberg Relation, Shape of interface, control of seawater intrusion. Groundwater Basin Management: Concepts of conjunction use, Case studies.

Text Books:

1. Ground water Hydrology, David Keith Todd and Larry W. Mays, John Wiley & Son, New York, 3rd Edition, 2015.

Reference Books:

1. Hydrology, H. M. Raghunath, New Age International (P) Limited Publishers,3rd Edition, 2006
2. Manual on Artificial Recharge of Groundwater, Central Ground Water Board, Ministry of water resources, Govt. of India, 2007.

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CONCRETE & HIGHWAY MATERIALS LAB

B Tech IV Year I Semester – CIVIL

L	T	P	C
0	0	2	1

Course Outcomes

After completion of this course students will be able to

CO1: Examine the experimental strength of aggregate materials as per codal provisions.
CO2: Compute the properties of bituminous materials.
CO3: Determine the properties of cement by conducting the test.
CO4: Define the workability of fresh concrete by conducting tests.
CO5: Estimate the strength of hardened concrete by conducting destructive and non destructive testing.

List of Experiments:

1. Determine the Crushing & Impact value of given coarse aggregate sample.
2. Determine the Specific Gravity and water absorption for given sample of aggregates.
3. Determine Abrasion& Attrition value for given sample of aggregates.
4. Determine Flakiness and Elongation index for given sample of aggregates.
5. Determine the Consistency& Ductility of given Bitumen sample.
6. Determine the Softening point, Flash and Fire point of given Bitumen sample.
7. Determine the Fineness& Standard Consistency of the given cement sample.
8. Determine the Initial & Final setting time of the given cement sample.
9. Determine the Specific Gravity & Soundness of the given cement sample.
10. Determine the Young's Modulus and Compressive strength of given concrete& Cement mortar specimens.
11. Determine the Workability of given fresh concrete sample.
12. Determination of Bulking percentage of given Fine Aggregate sample &Demonstration of NDT.

COMPUTATIONAL LAB

B.Tech IV Year I Semester – CIVIL

L	T	P	C
0	0	2	1

Course Outcomes

After completion of this course students will be able to

- CO1: Escalate with the usage of recent software's and its applications in the field of civil engineering
- CO2: Analyse the Beam and Slab using Staad Pro software
- CO3: Assess the frame using the Staad Pro
- CO4: Interpret the slope stability by using Geo5
- CO5: Assess the settlement of footing

List of Experiments

1. Introduction and practice of the basic functions use in the Python computing
2. To develop the programme for Bending moment, Shear force and Deflection at incremental segments of simply supported beam subjected to eccentric point load and UDL throughout the span.
3. Demonstration and explanation on basic commands used in Staad.pro
4. Analyse of Continuous beam using Staad.pro
5. Analyse of slab using Staad.pro
6. Analyse of 2D frame using Staad.pro
7. Analyse of space frame using Staad.pro
8. Demonstration of administrator settings of Geostudio
9. Analysis of slope stability with homogeneous and stratified soil condition.
10. Stability of slope with retaining wall
11. Settlement analysis of spread footing
12. Analysis of single pile settlement

List of Software Required

1. Staad pro - Licensed version.
2. Geostudio - Educational version
3. Python - Open resource

INDUSTRIAL ORIENTED MINI PROJECT (Summer Vacation between III- II and IV-I)

B.Tech IV Year I Semester - CIVIL

L	T	P	C
0	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Interpret the literature and develop solutions for framing problem statement

CO2: Select software techniques for identifying problems

CO3: Analysis and test the modules of planned project.

CO4: Design technical report and deliver presentations.

CO5: Apply engineering and management principles to achieve project goals.

Content

There shall be an industry-oriented Mini-Project, in collaboration with an industry of department specific specialization, to be taken up during the summer vacation after III year II Semester examination. However, the mini-project and its report shall be evaluated along with the project work in IV year I Semester. The industry oriented mini-project shall be submitted in a report form and presented before the committee. The committee consists of an external examiner, Head of the Department, the Supervisor of the Mini-project and a Senior Faculty member of the department. There shall be no internal marks for industry oriented mini-project.

B. Tech. IV Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	PE – IV	Rehabilitation and Retrofitting of Structures	3	0	0	3
2	PE – V	Remote Sensing & GIS	3	0	0	3
3	–	Technical Seminar	0	2	0	2
4	–	Comprehensive Viva Voce	0	0	0	2
5	PW-2	Major Project	0	0	20	10
		Total	**6**	**2**	**20**	**20**

REHABILITATION AND RETROFITTING OF STRUCTURES

B.Tech IV Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes :

After completion of this course students will be able to

CO1: Illustrate the importance of inspection and maintenance.
CO2: Summarize the Impacts of corrosion and fire damage on structures.
CO3: Identify the damage assessment and testing of structural components.
CO4: Understand the materials and techniques needed for repairs.
CO5: Examine the failures of the structures and health monitoring with Optimization techniques.

UNIT – I

Introduction: Maintenance, Repair and Rehabilitation – Types Of Maintenance – Deterioration of structures – Distress in structures – causes and prevention. Mechanism of Damage – Types of Damage

UNIT – II

Corrosion of steel Reinforcement: Causes – Mechanism and prevention. Damage of structure due to fire- fire rating of structures- Phenomena of Desiccation

UNIT – III

Inspection and Testing: symptoms and diagnosis of distress – Damage assessment – NDT

UNIT – IV

Repair of structure: common types of repairs – repair in concrete structures – repairs in underwater structures- Guniting – short create – Underpinning. Strengthening methods. Retrofitting – jacketing

UNIT – V

Health monitoring: structures and its health – use of sensors – building instrumentation.

Text Books:

1. Maintenance and repair of civil structures, B.L. Gupta and Amit Gupta, Standard publications, 1st Edition 2007.
2. Concrete Technology, A.R. Shantha Kumar, Oxford university Press, New Delhi, 1st Edition, 2010.

Reference Books:

1. Repair and Rehabilitation of Concrete Structures, Shonam I. Modi, Chirag N. Patel, PHI Learning Pvt. Ltd.

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REMOTE SENSING AND GIS

B Tech IV Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes:

After completion of this course students will be able to

CO1: Understand the concepts of Photogrammetry and compute the heights of the objects using parallax

CO2: Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies

CO3: Understand the basic concept of GIS and its applications, know different types of data representation in GIS

CO4: Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates systems

CO5:Remote sensing gives the provision of understanding about water resources management and monitoring.

UNIT - I

Introduction to Photogrammetry

Principle and types of aerial photographs, stereoscopy, Map Vs Mosaic, ground control, Parallax measurements for height, determinations

UNIT - II

Remote Sensing – I: Basic concepts and foundation of remote sensing elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units

Remote Sensing – II: Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT - III

Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

Types of data representation: Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS File management, Spatial data Layer based GIS, Feature based GIS mapping.

UNIT - IV

GIS Spatial Analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data

UNIT - V:

Water Resources Applications-I: Land use Land cover in water resources, Surface water mapping and inventory, Rainfall Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics

Water Resources Applications – II: Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

Text Books

1. Remote Sensing and its applications, L. R A Narayana, University Press, 1999.
2. Principles of Geo physical Information Systems, Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.

Reference Books:

1. Concepts & Techniques of GIS, C.P. Lo, Albert K.W. Yeung, Prentice Hall Publications, 2007.

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2. Remote Sensing and Geographical Information systems, M. Anji Reddy, B.S. Publications, 2001.
3. Introduction to Geographical Information Systems, Kang – Tsung Chang, TMH Publications & Co. 4th Edition,2007

TECHNICAL SEMINAR

B.Tech IV Year II Semester – CIVIL

L	T	P	C
0	2	0	2

Course Outcomes

After completion of this course students will be able to

CO1: Demonstrate the skills in identifying, analysing, and presenting a research topic

CO2: Demonstrate the quality of knowledge gained from the literature survey on recent technologies

CO3: Demonstrate the skills developed to communicate effectively on engineering activities with the engineering community

CO4: Demonstrate ability to effectively manage time in presentation skills

CO5: Design a technical report with the principles of ethics

Content

There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding of the topic, and submit it to the department. It shall be evaluated by the departmental committee consisting of the Head of the Department, Seminar Supervisor and a Senior Faculty member.

COMPREHENSIVE VIVA VOCE

B.Tech IV Year II Semester – CIVIL

L	T	P	C
0	0	0	2

Course Outcomes

After completion of this course students will be able to

CO1: Explain comprehensively to answer questions from all the courses

CO2: Test Oral Presentation skills by answering questions in a precise and concise manner

CO3: Build confidence and interpersonal skills

CO4: Support the students to face interview both in the academic and the industrial sector

CO5: Improve placements and better performers in their future.

Content

The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive VivaVoce is intended to assess the students understanding of the courses he studied during the B. Tech. course of study. There are no internal marks for the Comprehensive Viva-Voce.

MAJOR PROJECT

B.Tech IV Year II Semester - CIVIL

L	T	P	C
0	0	20	10

Course Outcomes

After completion of this course students will be able to

CO1: Identify, Analyse and apply suitable current techniques and tools to solve a problem in the civil engineering domain and societal issues.

CO2: Function effectively in teams to accomplish a common goal.

CO3: Organise the technical report writing and communication effectively.

CO4: Extend in lifelong activity.

CO5: Define and analyse a problem to assess health, safety and legal issues.

Content

The End Semester Examination of the project work shall commence from IV-II and internal evaluation shall be conducted by the committee as appointed for the major-project. In addition, the Project Supervisor shall also be included in the committee. The Internal Evaluation shall be on the basis of two reviews given by each student on the topic of the project. The major project topics hall be different from industry oriented mini project, seminar and mini project work. The external evaluation of major project work shall be made at the end of the IV-II by the external examiner along with the Head of the Department, the Supervisor of the project and a Senior Faculty member of the department.

OPEN ELECTIVES OFFERED BY CIVIL ENGINEERING DEPARTMENT

Category	Course Title
OE-1	1. Elements of civil Engineering 2. Smart cities 3. Disaster Management
OE-2	1. Green building Technologies 2. Environmental Pollution & control methods 3. Construction Management
OE-3	1. Remote Sensing & GIS 2. Introduction to earthquake Engineering 3. Solid Waste Management

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ELEMENTS OF CIVIL ENGINEERING (OE1)

B.Tech III Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcome

After completion of this course students will be able to

- CO1: Understand Geological properties and of civil engineering.
- CO2: Plan the concept of different building byelaws and planning principles.
- CO3: Analyse the properties of the fluid changes treatment process.
- CO4: Apply modern tools of surveying.
- CO5: Evaluate the principles of highway geometric designs and types of pavements as per IRC standards.

UNIT – I

Basics of Engineering Geology: Geology – branches of geology – weathering of rocks – mineralogy – definition – importance of study of minerals – classification of minerals – petrology – geological classification of rocks. Soil formation, types of soils

UNIT – II

Building materials, building components: Stones – Classification, quarrying and methods of quarrying. Bricks – Components of Brick. Building Components – Lintels, arches, walls, staircase, floor and roofs, doors and windows, DPC, Building planning and building byelaws

UNIT – III

Fluid mechanics: Dimensions and units – physical properties of fluids – specific gravity – surface tension –Problems viscosity –vapor pressure and their influences on fluid motion- Cavitation- Atmospheric , Guage and Vaccum Pressure

UNIT – IV

Surveying: Definition of surveying – principle- types of surveying-objectives and classification – Total Station: Limitation, Advantages. GIS: Applications-GPS

UNIT – V

Transportation engineering: Highway Development in India – Necessity for Highway Planning- Different Road Development Plans. Classification of Roads – Road Network Patterns. Super elevation Types of Intersections – Introduction to flexible & rigid pavements – advantages – limitations. Parking studies- road accidents and preventive measures- traffic signs- road markings.

Text Books:

1. Engineering Geology, N. Chennakesavulu, Mc-Millan India Ltd, 3rd Edition 2018.
2. Building Construction, Rangawala, Charotar Publishing House Pvt. Ltd, 43rd Edition, 2019.
3. Highway Engineering, S.K Khanna & C.E.G Justo, Nemchand & Bros., 7th Edition, 2000.

Reference Books:

1. A Textbook of Fluid Mechanics and Hydraulic Machines, Dr. R.K Bansal, Laxmi publications pvt Ltd, 9th Edition, 2015
2. Engineering Materials, Rangawala, Charotar Publishing House Pvt.Ltd, 1st Edition,2011.
3. Surveying (Volume I), S.K Duggal, Mc Graw Hill , 5th Edition, 2019
4. A Text Book of Remote Sensing & Geographical Information System, M.Anji Reddy, BS Publications, 4th Edition, 2012.

1. 2. 3. 4. 5.

6. 7. 8. 9. K.Devi

SMART CITIES (OE I)

B.Tech III Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcome

After completion of this course students will be able to

CO1: Understand the necessity of smart infrastructure and to promote cities that provide quality of life to citizens

CO2: Explain technology based solution on smart mobility

CO3: Illustrate & introduce the smart and sustainable waste and water management for smart cities

CO4: Apply Energy Efficient strategies in city

CO5: Evaluate economical models for smart infrastructure solution

UNIT – I

Introduction: Defining Smart cities & Types, Sustainable Development & Cities, Need for smart city,Concept of smart cities, Smart city components and Categories, Potential locations, Physical infrastructure, social infrastructure, Smart City Mission

UNIT – II

Smart Mobility: Objectives & Components of smart mobility, Emerging concepts & strategies.

ICT supported mobility systems as- Real time traffic Information system, Parking Information system, car bike sharing system, Modal split,

Public Mobility – Vehicle & Transport solutions

UNIT – III

Smart Water &Waste Management: Functions & Objectives of smart water management, Smart water management solutions, benefits,

Smart waste management objectives & Scope, Waste management Approaches, Smart waste management strategies – Smart Bins, Automated waste Collection system (AWCS),Swachh Bharat Mission

UNIT – IV

Smart Energy: Smart Energy Concept, Objectives & Elements, Strategies for smart Energy-Energy Efficient buildings & use of Renewable energy, smart Grid,

UNIT – V

Towards Smart Cities: Investment for Land, Power, Water, and Highway and Road- Rail Connectivity, Fuel Pipe Lines, Smart Economics concept & benefits, Smart Governance Functions & Objectives, Smart Cities- Indian case studies

Text Books:

1. Introduction to smart cities, P P Anil kumar, First Edition,2019
2. Smart City, Arun Hiroshi,Vishwesh Pavnaskar Foreword by Dr. Narayana Murthy,Vishwakarma publications, 1 Edition, 2015

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DISASTER MANAGEMENT (OE-I)

B.Tech III Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes:

After completion of this course students will be able to

- CO1: Understanding the various types of disaster and its effect.
- CO2: Illustrate the aspects of Environmental impacts assessment (EIA).
- CO3: Demonstrate assessment of risk mitigation.
- CO4: Assess the functional impacts of disaster management.
- CO5: Integrate the management cycle and risk reduction.

UNIT-I

Introduction To The Different Types Of Disasters:

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, Is. landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT-II

Environment And Disasters:

Environment, ecosystem and disasters. Climate change – issues and concerns. Industrial hazards and safety measures. Post disaster impact on environment. Impact of developmental projects on disaster risk. Aspects of environmental management for disaster risk reduction. Environmental Impact Assessment (EIA).

UNIT-III

Disaster Risk Mitigation:

Disaster risk assessment (Hazard-Vulnerability-Capacity analysis). Hazard mapping and forecasting. Principles and aspects of Disaster prevention Disaster mitigation Preparedness for damage mitigation and coping with disasters. Capacity building for disaster damage mitigation (structural and non-structural measures). Contingency planning for damage mitigation of different hazards.

UNIT-IV

Disaster Management:

Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework, financial arrangements, role of NGOs, community – based organizations and media. Central, state, district and local administration; Armed forces in disaster response, Disaster responses, Police and other organizations.

UNIT-V

Planning For Disaster Rescue AndRisk Reduction:

Community-hazard profile of the disaster site. DM cycle. Different phases of Disaster Management :Predisaster stage, Emergency stage, Post disaster stage. Implementation of different disaster management phase and Relief mechanism during different disaster stages including cyclones, earthquakes, fire accidents, Tsunami, landslides etc. Disaster Management Act (2005); Disaster Management Policy (2009);

Text Books:

1. Disaster Mitigation: Experiences And Reflections, Pradeep Sahni, 1st Edition 2013.
2. Natural Hazards & Disasters, Donald Hyndman & David Hyndman, Cengage Learning,1st Edition, 2009.

1. 2. 3. 4. 5.

6. 7. 8. 9. KDev

DISASTER MANAGEMENT (OE 1)

B.Tech III Year I Semester CIVIL

L	T	P	C
3	0	0	3

Course Outcomes:

After completion of this course students will be able to

- CO1: Understanding the various types of disaster and its effect
- CO2: Illustrate the aspects of Environmental impacts assessment (EIA)
- CO3: Demonstrate assessment of risk mitigation
- CO4: Assess the functional impacts of disaster management
- CO5: Integrate the management cycle and risk reduction

UNIT-I

Introduction To The Different Types Of Disasters:

Natural Disasters: Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, Tsunamis, avalanches, volcanic eruptions, Heat and cold waves, Climatic change, global warming, Sea level rise, ozone depletion.

Man Made Disasters: Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT-II

Environment And Disasters:

Environment, ecosystem and disasters. Climatic change – issues and concerns. Industrial hazards and safety measures. Fire disaster impact on environment. Impact of developmental projects on disaster risk. Aspects of environmental management for disaster risk reduction. Environmental Impact Assessment (EIA).

UNIT-III

Disaster Risk Mitigation:

Disaster risk assessment (Hazard Vulnerability Capacity analysis). Hazard mapping and forecasting. Principles and aspects of Disaster prevention Disaster mitigation Preparedness for damage mitigation and coping with disasters. Capacity building for disaster damage mitigation (structural and non structural measures). Contingency planning for damage mitigation of different hazards.

UNIT-IV

Disaster Management:

Effort to mitigate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework. financial arrangements, role of NGOS, community based organizations and media. Central, state, district and local administration. Armed forces in disaster response. Disaster response. Police and other organizations.

UNIT-V

Planning For Disaster Rescue AndRisk Reduction:

Community based people of the disaster site. DM cycle. Different phases of Disaster Management. Predisaster stage. Emergency stage. Post disaster stage. Implementation of different disaster management phase and Relief mechanism during different disaster stages including explosives, earthquakes, fire accidents, Tsunamis, landslides etc. Disaster Management Act (2005). Disaster Management Policy (2009).

Text Books:

1. Disaster Mitigation: Experiences And Reflections, Pradeep Sahni, 1st Edition 2013
2. Natural Hazards & Disasters, Donald Hyndman & David Hyndman (Cengage Learning), 1st Edition, 2009

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GREEN BUILDING TECHNOLOGIES (OE 2)

B Tech III Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Understand the Green building concept and focus on approaches that make building sustainable

CO2: Illustrate Green building assessment and accreditation systems

CO3: Able to apply low energy building strategies

CO4: Design green building to improve sustainability of infrastructure

CO5: Classify the economic benefits of green buildings

UNIT – I

Introduction: The shifting landscape of green buildings, The driving forces for sustainable construction, Ethics and sustainability, Basic Concepts and Vocabulary, Major Environmental and resource concerns, International Building Assessment systems

UNIT – II

The green building assessment system: Structure of the LEED suite of Building rating systems, LEED Credentials, LEED Building Design and construction Rating system, Green Globes Building Rating Tools, Structure of Green Globes for New Construction, Green Globes Assessment and Certification Process, Green Globes Professional Credentials, IGBC Building design, Rating system and Professional credentials, Green Building Documentation Requirements

UNIT – III

Green building design: Conventional versus Green Building Systems, green materials, material selection criteria, Executing the Green Building Project, Integrated Design Process, Role of the charrette in the design process,

UNIT – IV

Low – energy building strategies: Building Energy Issues, High – Performance Building Energy Design Strategy, Passive Design Strategy, Building Envelope, Internal Load Reduction, Smart Buildings and Energy Management Systems

UNIT – V

Green building economics and sustainable construction: General approach, The Business Case for High – Performance Green Buildings, Economics of Green Building, Quantifying Green Building Benefits, Articulating Performance Goals for Future Green Buildings

Text Books:

1. Sustainable Construction, CHARLES J. KIBERT, John Waley& sons, 4th Edition,2016.
2. Sun, Wind & Light - Architectural design strategies, Mark Dekay & G.Z Brown, John Wiley & sons, 3rd Edition, 2014

Reference Books:

1. IGBC Reference manual (2016)

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ENVIRONMENTAL POLLUTION & CONTROL METHODS (OE 2)

B Tech III Year II Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcome

After completion of this course students will be able to

CO1: Understanding about the various air pollutants and effect on environment

CO2: Analyze quality of air in the form of air quality index and dispersion modeling

CO3: Elaborate about water pollution and solid waste management

CO4: Analyses and measurement of soil contamination

CO5: Predict types of noise and problems arise due to noise pollution

UNIT – I

Introduction to air pollution: Air and its composition. Air Pollution, Sources of air pollution and its classification. Major air Pollutants and their characteristics. Specific group pollutants such as CFC, GHG etc. Air Pollutants from various industrial sectors, Impact of air pollution on human health and vegetation.

UNIT – II

Air quality: Introduction to Air quality index and Comprehensive Environmental Pollution Index etc. and its application. Sampling and measurement of air pollutants, Introduction to National Ambient Air Quality Standards.

Impacts of Air Pollution: Extreme air Pollution scenarios. Acid Rain, Global Warming, Smog, Ozone layer depletion etc.

UNIT – III

Water Pollution: Introduction to water pollution, sources of water pollution- Industrial, Agricultural, and Biomedical. Water Management and its Benefits, Impacts of water Pollution

Solid waste Management- Introduction, Definition, Types of solid waste, Municipal Solid Waste management and Industrial Waste Management

UNIT – IV

Soil pollution: Soil contamination by chemical pollutants, sources, Remediation by plants, bioremediation by microorganisms, contamination by inorganic (including heavy metals) and organic pollutants, factors affecting uptake of contaminants, prevention and elimination of contamination, landfills. Effects of atmospheric deposition on various types of soils, cation exchange capacity (CEC) of soils.

UNIT – V

Introduction to noise: Difference between sound and noise, Pitch and Frequency, Sound Pressure, Sound Pressure level (Decibel), and sources of noise and harmful effects of noise, noise measurement and noise control measures.

Text Books:

1. Environmental Pollution Control and Engineering, Rao C.S., New Age International (P) Limited, 1st Edition, 1991.
2. Air Pollution, Perkin, H.C. McGraw Hill, 1st Edition, 1974.

1. 2. 3. 4. 5.

6. 7. 8. 9. K Devi

CONSTRUCTION MANAGEMENT

B.Tech III Year II Semester – CIVIL

Course Outcomes:

After completion of this course students will be able to:

CO1: Understand the construction management skills as a member of a multi- disciplinary team.

CO2: Apply to construction planning techniques.

CO3: Analyse construction documents for planning and management of construction processes.

CO4: Apply knowledge, techniques, skills, and tools of the construction industry in construction activities.

CO5: Understand the legal implications of contract, common, and regulatory law to manage a construction project.

UNIT-I

CONSTRUCTION PLANNING AND MANAGEMENT: Significance of Construction Management, Objectives and Functions of Construction Management, Types of Construction, Resources for Construction Industry, Various stages in Construction, Construction Management Team & Types of Organization.

UNIT–II

PROJECT PLANNING: Project Planning Techniques, Planning of Manpower, Materials, Equipment and Finance, Scheduling by Bar Charts, Limitations of Bar Charts.

PERT&CPM: Significance of CPM&PERT Techniques in Construction Management, Project Scheduling, Network Analysis, Cost-Time Analysis in Network Planning, Float, Total float & free float.

UNIT– III

CONTRACT MANAGEMENT: Types of contracts, contract document, specification, important conditions of contract–tender and tender document. Deposits by the contractor

BIDDING: Definition and Process, Various steps in Bidding, M Book- MusterRoll

UNIT–IV

CLAIM MANAGEMENT: Construction claims, Source of claim, Claim Management, Disputes and Dispute resolution, Arbitration and its advantages, project closure, Construction closure, Contract closure

UNIT–V

REGULATIONS AND SAFETY: Labour Regulations, Social Security – welfare legislation – Laws relating to Wages – Workmen's Compensation Act – Safety in Construction, legal and financial aspects of accidents in construction.

Text Books:

4 Construction Planning and Management, P.S. Gahlot & B.M. Dhir, Wiley Eastern Limited, 2nd Edition,2018.

5 Construction Project Management, Chitkara K.K., Tata McGraw Hill Publishing Co. 4th Edition, 2019.

Reference Books:

1 Fundamentals of Management, Stephen A. Robbins & DavidA. Decenzo & Mary Coulter, 14th Edition, 2016.

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REMOTE SENSING & GIS (OE3)

B Tech IV Year I Semester – CIVIL
Course Code:

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Select the type of remote sensing technique / data for required purpose.
CO2: Identify the earth surface features from satellite images.
CO3: Analyze the energy interactions in the atmosphere and earth surface features.
CO4: Prepare thematic maps.
CO5: Interpretations of satellite data for various applications.

UNIT – I

EMR and its interaction with atmosphere &Earth :Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan Boltzmann and Wien's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

UNIT – II

Platforms and sensors: Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and space borne TIR and microwave sensors.

UNIT – III

Image interpretation and analysis: Types of Data Products – types of image interpretation – basic elements of image interpretation – visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

UNIT – IV

Geographic information system: Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS software – Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).

UNIT – V

Data entry, storage and analysis: Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System.

Text Books:

1. Remote Sensing and Image Interpretation, Lille sand T.M., Kiefer, R.W. and J.W. Chipman, John Willey and Sons Asia Pvt. Ltd., 5th Edition, 2004.
2. Introduction to Geographical Information Systems, Kang – Tsung Chang, TMH Publications & Co. 4th Edition,2007.

References Books:

1. Remote sensing and Geographical information system, M. Anji Reddy, B.S. Publications, 4th Edition, 2001.
2. Basics of remote sensing & GIS, S. Kumar, Laxmi publications, 1st Edition, 2016.

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INTRODUCTION TO EARTHQUAKE ENGINEERING (OE-3)

B.Tech IV Year I Semester : CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Understand the Interior of Earth surface and the occurrence of earthquake.
CO2: Illustrate the plate tectonics plate and fault attenuation.
CO3: Evaluate the quantitative measure of energy release.
CO4: Compute the mechanical behavior of earth surface and its significance
CO5: Classify different earthquake hazards and its effects.

UNIT – I

Introduction: Interior of the Earth – Earthquakes phenomenon causes of earthquake, Nature and Occurrence of earthquakes - effects of earthquakes, Consequences of Earthquake damage – Terms associated with earthquakes.

UNIT – II

Engineering Seismology: Elastic rebound theory, Plate tectonics, Different plate theories – lithospheric plates – plate margins & Earthquake occurrences - movement of plates, Faults & fault types, Earthquake classification.

UNIT – III

Measurements of Earthquakes: Magnitude/Intensity of an earthquake – scales – Energy released – Earthquake measuring instruments – Seismoscope, Seismograph and accelerograph – Interpretation of Seismic Records, Seismic zones of India – Concept of seismic micro zonation.

UNIT – IV

Strong Ground Motion: Response of Structure to Earthquake Motion, Fundamentals of wave motion – seismic wave types. Reflection and refraction of plane waves at a plate boundary - boundary conditions, Energy conversions, focus on Indian earthquakes.

UNIT – V

Seismic Hazard: Introduction to Seismic Hazard, types of hazard, Time parameters of hazards, Local site effects and evaluation methods.

Concepts of Earthquake resistant building: Building configurations – Introduction – Functional planning – Continuous load path – Characteristics of Buildings.

Text Books:

1. Earthquake Resistant Design of structures, Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd, 1st Edition, 2016.
2. Earthquake Resistant Design of structures, S. K. Duggal, Oxford University Press, 2nd Edition, 2007.

Reference Books:

1. Introduction to Earthquake Engineering, Hector Estrada & Luke S Lee, CRC Press, Taylor & Francis Group, 3rd Edition, 2017.
2. Earthquake Resistant Design of Building structures, Vinod Hosur, Wiley India Pvt. Ltd, 3rd Edition, 1992.
3. Earthquake Tips – Learning Earthquake Design and Construction, C.V.R. Murthy, 2005.

1. 2. 3. 4. 5.

6. 7. 8. 9. K Devi

SOLID WASTE MANAGEMENT (OE3)

VJIT-B Tech – R21

B.Tech IV Year I Semester – CIVIL

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Illustrate the hierarchical structure in solid waste management and an integrated solution.

CO2: Apply the legal legislation, economic analysis of the solid waste management system.

CO3: Identify route optimization for a solid waste collection and transport system.

CO4: Understand legal and economical points related to general solid waste management.

CO5: Plan site selection for a landfill.

UNIT I

Waste Management: Solid waste problem, meaning and definition of solid waste, concept and classification of municipal solid waste, Impacts of solid waste on environment.

UNIT II

solid waste management rules and Regulations: Developing a solid waste collection and transfer system, characterizing waste generation, Determining public and private collection or transfer options.

UNIT III

Waste management techniques: Solid waste management Hierarchy, waste prevention, definition of source reduction, waste reduction at source using 5R's Technique.

UNIT IV

Waste disposal Techniques: Waste disposal, composting, principles of composting, factors affecting composting, vermi composting, waste to energy techniques, Landfill technique and design and operating procedure of landfill

UNIT V

Solid waste management of Biomedical waste, plastic and E-waste: Biomedical waste – sources and generation, biomedical waste management, plastic – Dangers of plastic wastes, Recycling and disposal of plastic wastes, E – wastes Definition, Health hazards, E – waste management and conclusion

Text Books:

1. Solid waste Management, K. Sasi Kumar & S. Gopi Krishna, Prentice-Hall Publishers, 1st Edition, 2009.
2. Solid waste Management, Jagbir Singh & A.L. Ramanathan, I K. International Publishing House Pvt Ltd, 1st Edition, 2009.

Reference Books:

1. Management of Municipal Solid waste, T.V. Ramachandra, The Energy and Resources Institute, TERI, 1st Edition, 2009.
2. Municipal Solid waste Management in India, Subhrabaran Das & KorobiGogoi, VDM Verlag Publisher, 1st Edition, 2010.
3. Handbook of Solid Waste Management, George Tchobanoglous and Frank Kreith, McGraw-Hill I., 2nd Edition, 2002.

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Department of Civil Engineering

R21 COURSE STRUCTURE AND SYLLABI FOR B.TECH WITH MINOR PROGRAM OFFERED BY CIVIL ENGINEERING

Minor in

Construction Engineering and Management

COURSE STRUCTURE

S. No	Year Semester	Course	Mode of Learning	No. of Credits
MC 1	III-I	Principles of Surveying/ **MOOCS**	Conventional/MOOCS	3
MC 2	III-I	Surveying Lab	Conventional	1.5
MC 3	III-II	Essentials of building planning / **MOOCS**	Conventional /MOOCS	3
MC 4	III-II	Computer aided Building planning Lab	Conventional	1.5
MC 5	IV-I	AI applications in construction practices	Conventional	3
MC 6	IV-I	Construction Management/ **MOOCS**	Conventional /MOOCS	3
MC 7	IV-II	Mini Project	Conventional	3
			Total Credits	**18**

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PRINCIPLES OF SURVEYING

L	T	P	C
3	0	0	3

Course Outcomes

Students who successfully complete this course will have demonstrated ability to

- CO1: Students will be able to perform a detailed surveying at any site by any method.
- CO2: Ability to use modern survey equipment to measure angles and distances.
- CO3: Ability to measure differences in elevation, draw and utilize contour plots, and calculate volumes for earthwork.
- CO4:Understand the working principles of modern equipment and its methodologies.
- CO5: Analyze the basic concept of GPS and its applications.

UNIT – I

Introduction to surveying: Definition of surveying, objectives of surveying, principles and types (plane surveying and geodetic surveying), Scales (Plane, diagonal, chord, vernier, microt, Conventional Symbols and Signals.

UNIT – II

Distances and direction:

Distance measurement methods, electronic distance measurements, meridians, azimuths and bearings, declination, computation of angle.

UNIT – III

Leveling and contouring: Level, types of levels (Dumpy, reversible, tilting, digital) and there parts, Temporary adjustements – method of leveling (Simple, differential, fly, profile, precise, reciprocal). Contours, Characteristics and Uses of contours.

UNIT – IV

Modern field surveying systems: Electronic distance measurements, types of EDM instruments (Microwave instruments, Infrared wave instruments, Light wave instruments), total station – parts of a total station – accessories – advantages and applications, errors in total station survey.

UNIT – V

Introduction to Remote Sensing: Global positioning systems – segments, GPS measurements, errors or biases, surveying with GPS, Co-ordinate transformation, accuracy considerations, electromagnetic spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, Remote sensing data acquisition, platforms and sensors, visual image interpretation, digital image processing.

Text Books

1. *Duggal S K. "Surveying (Vol – I & 2). Tata Mc Graw Hill Publishing Co. Ltd. New Delhi, 2004.*
2. *AnjiReddy M. Remote sensing geographical information system. B.S. publications, 2001.*

References

1. *Surveying and Levelling by R. Subramanian. Second Edition Oxford University Press – 2012*
2. *Chandra A M. "Plane Surveying and Higher Surveying". New age International Pvt. Ltd.*

1 2 3 4 5

6 7 8 9 K Dey

Publishers, New Delhi, 2002

2. *"Advanced Surveying Total Station GIS and Remote Sensing by Satheeshkumar R. Sathi Kumar and N. Madhu, Pearson Education India, 2007*

SURVEYING LAB

L	T	P	C
0	0	3	1.5

Course Outcomes:

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

- CO1: Apply the principle of surveying for civil engineering applications
- CO2: Apply the knowledge to calculate the areas, drawing plans and contour maps using different measuring equipment at field level
- CO3: Identify data collection methods and prepare field notes
- CO4: Understand the working principles of survey instruments, measurement, errors and correction techniques
- CO5: Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and its methodologies

List of experiments

1. Survey of an area by chain surveying
2. Determination of two inaccessible points by using prismatic compass
3. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
4. An exercise on L.S.C.S and Plotting
5. Trigonometric leveling – Heights and distance problem
6. Determination of Area & Remote height using total station
7. Traversing & Coordinating using total station
8. Distance, gradient, Diff. height between two inaccessible points using total station
9. Study of use of GPS for data collection
10. Collection of Point Data, Line Data, and Polygon Data using GPS

ESSENTIALS OF BUILDING PLANNING

L	T	P	C
3	0	0	3

Course outcomes

On successful completion of this course, it is expected that the students will be able to:

- CO1: Identify various building components, conventional signs and symbols
- CO2: Illustrate the building bye-laws and the principles of planning
- CO3: Understand about the building services and safety
- CO4: Design and Sketch the plans of various types of buildings and detailing of doors, windows, etc
- CO5: Understand the elements of perspective drawing involving simple problems.

UNIT – I

Basic components of buildings: Various components of building like various types of footing (isolated & pile), various types of door, window, and ventilators, lintels and arches, stairs and staircase, trusses, flooring, roofs etc and its applications in building planning.

UNIT – II

Building planning: provision on national building code, building bye-laws, open area, setbacks, FAR terminology, principles of architectural composition (ie. Unity, contrast etc) , principles of planning.

UNIT – III

Building Services - Introduction of building services like water supply and drainage, electrification, ventilation and lighting and staircases, fire safety, thermal insulation, acoustics of buildings.

UNIT – IV

Design and Drawing of Building: Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, detailing of doors , windows, ventilators and staircases etc.

UNIT – V

Perspective Drawing: Elements of Perspective Drawing involving simple problems , one point and two point Perspectives, principles of energy efficient buildings

Textbooks

1. *Building Planning and Drawing, N Kumar swamy and Kameswar Rao, charotar publications, 7th Edition, 2015*
2. *Building planning, Design and scheduling, Gurucharan Singh Jagdish Singh 2nd edition, 2008.*

References

1. *Building drawing with an integrated approach to built environment , fourth edition, Shah , Kale &Patki,2002*

1. 2. 3. 4. 5.

6. 7. 8. 9. K Dev

COMPUTER AIDED BUILDING PLANNING LAB

L	T	P	C
0	0	3	1.5

Course Outcomes

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

- CO1: [illegible]
- CO2: Draft the Plan and Elevation & Sectional views of the buildings
- CO3: Detail of the components in the building
- CO4: [illegible] and Industrial structures
- CO5: Layout development as per the planning principles

List of Experiments

1. Introduction of the basic commands of CAD software
2. Practice exercises on basic commands of CAD software
3. Detailing of different types (any 2 types) of doors and its components by using CAD
4. Detailing of different types (any 2 types) of windows and its components by using CAD
5. Drawing of single line plans Single storey buildings
6. Drawing of plans of single storied buildings with Brick thickness
7. Drawing of plans of multi storied buildings with Brick thickness (Max G+3)
8. Developing sections and elevations of Single storey Buildings
9. Detailed drawing of Roof trusses by using CAD
10. Exercises on the development of working of building by using CAD (Layout development)

AI APPLICATIONS IN CONSTRUCTION PRACTICES

L	T	P	C
3	0	0	3

Course Outcomes

Students will successfully complete this course will have demonstrated ability to

- CO1: To understand the need of AI in intelligent construction practices
- CO2: Ability to understand different algorithms suitable for applications in civil engineering
- CO3: To illustrate the AI applications through different construction practices
- CO4: To discuss challenges in AI implementation in constructions

AI in construction

Unit I

Introduction: Need of Implementation of automation in construction practices, construction industry challenges in adopting automations, Adaptabilities, Features, Construction domains in automations, Advantages and disadvantages of Automations

Unit II

AI Techniques: Intelligent Optimization Methods in Civil Engineering, Genetic Algorithms, Artificial Immune Systems, Swarm Optimizations, Ant Colony Optimization

Unit III:

AI applications in Manufacturing: Automated Construction and Robotics, Precast Concrete constructions, Prefabrication of Masonry, Robotics in Timber Construction, Production of Steel Components

Unit IV:

AI applications in constructions: contour crafting, advantages & applications, prototyping, planning of buildings, plumbing and electrical works, roller painting, digital control concept, robotics in earth works, inspection of infrastructures

Unit V:

Challenges in AI: Different challenging construction problems, knowledge discovery, risk estimates, root cause analysis, damage assessment and prediction and defect detection. A tremendous transformation has taken place in the past years with the emerging applications of AI

Text book

1. Artificial Intelligence in Construction Engineering and Management (Lecture Notes in Civil Engineering Book 163) 1st ed. 2021 Edition, by [illegible], Springer

CONSTRUCTION MANAGEMENT

L	T	P	C
3	0	0	3

Course Outcomes

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

- CO1: Understand the behavioural aspect of entrepreneurs, various approaches of time management, their strength and weakness
- CO2: Apply the concepts of project management during the construction phase, project organization, project planning and control using CPM,PERT techniques
- CO3: Analysis various materials and equipment's for construction work.
- CO4: Examine the on different types of contracts and specifications.
- CO5: Outline the labour regulations and safety in construction.

UNIT – I

Management Techniques: Roles, Management theories, Social responsibilities, Planning and strategic management, Strategy implementation, Decision making tools and techniques – Organizational structure, Human resource management – motivation performance – leadership.

UNIT – II

Management Applications: Classification of Construction projects, Construction stages, Resources – Functions of Construction Management and its Applications Preliminary Planning – Collection of Data – Contract Planning – Scientific Methods of Management: Network Techniques in construction management – Bar chart, Gant chart, CPM, PERT, Cost & Time optimization.

UNIT – III

Resource Management: Resource planning – planning for manpower, materials, costs, equipment, Labour, Scheduling, Forms of scheduling – Resource allocation, Budget and budgetary control methods.

UNIT – IV

Contracts and Tenders: Contract – types of contract, contract document, specification, important conditions of contract – tender and tender document – Deposits by the contractor – Arbitration, Negotiation – M Book – Muster roll – stores.

UNIT – V

Management Information System: Labour Regulations: Social Security – welfare Legislation – Laws relating to Wages, Bonus and Industrial disputes, Labour Administration – Insurance and Safety Regulations, Workmen's Compensation Act – other labour Laws – Safety in construction, legal and financial aspects of accidents in construction, occupational and safety hazard assessment, Human factors in safety, legal and financial aspects of accidents in construction, Occupational and safety hazard assessment

Textbooks

1. *Ghalot, P.S., Dhir.D.M., Construction Planning and Management, Wiley Eastern Limited,1992*
2. *Chitkara,K.K., Construction Project Management, Tata McGraw Hill Publishing Co. Ltd., New Delhi,1998*

References

1. *Construction Management And Planning by : sengupta, b.guha, h.tatamcgraw-hill publications, 1993*

MINI PROJECT

L	T	P	C
0	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Interpret the literature and develop solutions for framing problem statement.
CO2: Select software techniques for identifying problems.
CO3: Analyze and test the modules of planned project.
CO4: Design technical report and deliver presentations.
CO5: Apply engineering and management principles to achieve project goals.

Content

There shall be department specific or multidisciplinary Mini-Project with industry applications, to be taken up IV-II semester. However, the mini- project and its report shall be evaluated by committee consists of an external examiner, Head of the Department, the Supervisor of the Mini-project and a Senior Faculty member of the department.

List of MOOCs courses on Swayam (NPTEL)

It is instructed that a student has to opt minimum 12 week online courses to earn the required credit.

1) Remote Sensing Essentials
2) Digital Land Surveying And Mapping (DLS&M)
3) Geographic Information Systems
4) Safety in Construction
5) Natural Hazards
6) Probability Methods in Civil Engineering
7) Urban Transportation Systems Planning
8) Introduction to Civil Engineering Profession
9) Urban Transportation Systems Planning
10) Architectural conservation and Historic preservation

Department of Civil Engineering

R21 COURSE STRUCTURE AND SYLLABI FOR B. TECH WITH HONORS PROGRAM

Honors in Structural Engineering

S. No	Year Semester	Course	Mode of Learning	No. of Credits
HC 1	III-I	Advanced R.C. Design	Conventional	3
HC 2	III-I	Advanced Concrete Lab	Conventional	1.5
HC 3	III-II	Structural Dynamics	Conventional	3
HC 4	III-II	Computer aided structural design Lab	Conventional	1.5
HC 5	IV-I	Research Methodology	Conventional	3
HC 6	IV-I	Technical Paper Writing	Under the mentorship of a supervisor	2
HC 7	IV-II	Cost management of Engineering projects- one course from MOOCS	Conventional MOOCS	3
HC 8	IV-II	Earthquake Resistant Design Of Buildings- one course from MOOCS	Conventional MOOCS	3
Total Credits				**20**

1 2 3 4 5

6 7 8 9 K Devi

ADVANCED REINFORCED CONCRETE DESIGN

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Understand the various design concepts of singly and doubly reinforced beam and draw the reinforcement details.

CO2: Design the beam under deflection and check the serviceability requirements for RC structural elements.

CO3: Analyze the rotation of RC members.

CO4: Design of different slabs with the reinforcement details

CO5: Explore the design concept of Corbels.

UNIT – I

Basic Design Concepts: Behaviour in flexure, Design of singly reinforced rectangular sections, Design of doubly reinforced rectangular sections, Design of flanged beams, Design of shear, Design for Torsion.

UNIT – II

Limit state of Serviceability: Deflections of Reinforced concrete beams and slabs, short term deflection and long term deflection, estimation of crack width in RCC members, calculation of crack widths.

UNIT – III

Limit Analysis of R.C. Structures: Rotation of a plastic hinge, Redistribution of moments, moment rotation characteristics of RC member, I.S. code provisions, and applications for fixed and continuous beam.

UNIT – IV

Flat slabs: Direct design method – Distribution of moments in column strips and middle strip-moment and shear transfer from slabs to columns – Shear in Flat slabs – Check for one way and two way shears – Introduction to Equivalent frame method.

UNIT – V

Design of Reinforced Concrete Deep Beams & Corbels: Steps of Designing Deep Beams, Design by IS 456, Checking for Local Failures, Detailing of Deep Beams, Analysis of Forces in a Corbels , Design of Procedure of Corbels, Design of Nibs.

Text books

1. *Reinforced concrete design by S.Unnikrishna Pillai & Menon, Tata Mc. Graw Hill, 2nd Edition 2004*
2. *Advanced Reinforced Concrete Design – P.C. Varghese, Prentice Hall of India, 2008*

1. 2. 3. 4. 5.

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References

1. *Reinforced concrete design by Kennath Leet, Tata Mc Graw-Hill International, editions, 2ndedition,1991*
2. *Design of concrete structures – Arthus H. Nilson, David Darwin, and Charles W. Dolar, Tata Mc. Graw-Hill, 3rd Edition, 2005*
3. *Limit state theory and design of reinforced concrete by Dr. S.R. Karve and Dr. V.L. Shah, Standard Publishers, Pune, 3rd Edition, 1994.*
4. *IS : 456 : 2000, Code of Practice for Plane and Reinforced Cement Concrete.*
5. *SP 16, SP 34*

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ADVANCED CONCRETE LABORATORY

L	T	P	C
0	0	3	1.5

Course Outcome

After completion of this course students will be able to

CO1: understand the properties of the materials and the behavior of the concrete.

CO2: Draw the Gradation Charts of Aggregates

CO3: apply the knowledge to calculate workability and permeability of concrete

CO4: identify the air entrainment and curing of concrete

CO5: Explore different Chemical Admixtures on concrete.

EXPERIMENTS

1. Tests on cement – Consistency, Setting time, Soundness, Compressive Strength.
2. Gradation Charts of Aggregates.
3. Bulking of fine Aggregate.
4. Aggregate Crushing and Impact value
5. Workability Tests on self compacting concrete
6. Air Entrainment Test on fresh concrete.
7. Marsh cone test.
8. Permeability of Concrete.
9. Non Destructive Testing of Concrete.
10. Accelerated Curing of Concrete.
11. Influence of W/C ratio on strength and Aggregate – Cement ratio on workability and Strength
12. Influence of Different Chemical Admixtures on concrete.

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STRUCTURAL DYNAMICS

L	T	P	C
3	0	0	3

Course Outcomes

After completion of these course students will be able to

CO1: Classify the concepts and principles of vibratory system

CO2: Evaluate the Methods of discretization technique

CO3: Analyze the Harmonic, Periodic, Impulsive and general dynamic loadings

CO4: Explain the solutions of Eigen value problem

CO5: Explore various types of Earthquake Response Systems

UNIT – I

Theory of vibrations: Introduction – Elements of vibratory system – Degrees of Freedom – Continuous System – Lumped mass idealization – Oscillatory motion – Simple Harmonic motion – Vectorial representation of S.H.M – Free vibrations of single degree of freedom system – undamped and damped vibrations – critical damping – Logarithmic decrement – Forced vibration of SDOF systems – Harmonic excitation – Dynamic magnification factor – Phase angle – Band width

UNIT – II

Introduction to Structural Dynamics: Fundamental objectives of dynamic analysis – Types of prescribed loading – Methods of discretization – Formulation of equations of motion by different methods – Direct equilibration using Newton's law of motion – D'Alembert's principle, Principle of virtual work and Hamilton principle

UNIT – III

Single Degree of Freedom Systems: Formulation and solution of the equation of motion – Free vibration response – Response to Harmonic, Periodic, Impulsive and general dynamic loadings, Duhamel integral.

UNIT – IV

Multi Degree of Freedom Systems : Selection of the degrees of Freedom – Evaluation of structural property matrices – Formulation of the MDOF equations of motion – Undamped free vibrations – Solutions of Eigen value problem for natural frequencies and mode shapes – Analysis of Dynamic response – Normal co-ordinates – Uncoupled equations of motion – Orthogonal properties of normal modes – Mode superposition procedure.

UNIT – V

Deterministic Earthquake Response of Systems – Rigid Foundation, Types of Earthquake Excitation – Response to Rigid – Soil Excitation, Lumped SDOF elastic systems – Lumped SDOF elastic system – Distributed Parameter Elastic Systems – SRSS, CQC combination of modal responses.

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6 7 8 9 K Devi

Text books

1. *Structural Dynamics by Mario Paz, CBS Publishers, New Delhi*
2. *Dynamics of Structures by Clough & Penzien, McGraw Hill, New York*

References

1. *Dynamics of Structures by Anil K. Chopra, Pearson Education (Singapore), Delhi*
2. *Vibrations, Dynamics and Structural systems by Madhujit Mukhopadhyay, CRC press*

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COMPUTER AIDED STRUCTURAL DESIGN LAB

L	T	P	C
0	0	3	1.5

Course Outcomes

After completion of these course students will be able to

CO1: Analyze and design of structural elements using computer aided tool

CO2: Understand the design concept using different software packages

CO3: Analyze the 2D building frame using STAAD Pro

CO4: Explain the design principle of circular water tank.

CO5: Design the bridge deck slab using STAAD Pro

EXPERIMENTS

1. Program for design of slabs Using Excel
2. Program for design of beams Using Excel.
3. Program for design of column using excel.
4. Program for design of footing using excel.
5. Program for design of staircase using excel.
6. Program for design of cantilever Retaining wall using excel.
7. Analysis of 2D building frame using STAAD Pro
8. Analysis of truss using STAAD Pro
9. Analysis of R.C.C. T-beams using STAAD Pro
10. Analysis of multistoreyed space frame using STAAD Pro.
11. Analysis of circular water tank using STAAD Pro.
12. Analysis of bridge deck slab using STAAD Pro.

RESEARCH METHODOLOGY

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Summarize the basic principles of Research and various methodologies.
CO2: Understand characteristics of good Hypothesis
CO3: Explore importance of Philosophical, Historical and Experimental aspects of research.
CO4: Identify Research Problem by rigorous literature review
CO5: Find the techniques to collect of Primary and secondary data

UNIT – I

Introduction to Research Methodology: Meaning of Research, Objectives of Research, Motivations in Research, types of Research, Research Approaches, Significance of Research, Research Methods v/s Methodology, Research and Scientific Methods, Research Process, Criteria of Good Research

UNIT – II

Research Questions and Hypothesis: Variables and their linkages, characteristics of good Hypothesis, Research question and formulation of hypotheses-directional and non-directional hypotheses, Basis for hypotheses

UNIT – III

Research design: Meaning, Need, Features of Good Design, Concepts, Types. Basic principles of Experimental Design, various methods of Research, Survey, Philosophical, Historical, Experimental, Causal Comparative, Genetic, Case Studies

UNIT – IV

Defining the Research Problem: Concept and need, Identification of Research problem, defining and delimiting Research problem, Exercise on research problem definition

UNIT – V

Tools for Data Collection: Collections of Primary Data, Collection of Data through questionnaire and Schedules, other Observation Interview Methods, Collection of Secondary Data, Selection of appropriate method for data collection, Case Study, Focus Group Discussion, Techniques of developing research tools, viz. Questionnaire and rating scales etc, Reliability and validity of Research tools.

Textbooks

1. Research Methodology, J.W. Best and J.V.Kahn, PHI Limited 7th Edition, 1995

2. Research Methodology: Methods and Techniques, Kothari, C.R., New Age Publisher, 2nd Edition, 2004

Reference Books

1. 2. 3. 4. 5.

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1. *Power Analysis for Experimental research A Practical Guide for the Biological, Medical and social Sciences by R. Barker Bausell, Yi Fang Li Cambridge University Press*
2. *Design of Experiment: Statistical Principles of Research Design and Analysis, by Robert O. Kuehl Brooks cole.*

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TECHNICAL PAPER WRITING

L	T	P	C
2	0	0	2

Course Outcomes

After completion of this course students will be able to

CO1: Understand that how to improve your writing skills and level of readability

CO2: Learn about what to write in each section

CO3: Understand the skills needed when writing a Title Ensure the good quality of paper at very first time submission

CO4: Analyze the results and explain in detail.

CO5: understand the importance of Conclusion and future scope.

UNIT – I

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy. Avoiding Ambiguity and Vagueness.

UNIT – II

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction Review of the Literature. Methods, Results, Discussion, Conclusions, The Final Check.

UNIT – III

Requirements for writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature

UNIT – IV

Requirements for writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion,

UNIT – V

Skills required for writing the Conclusions, useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Textbooks:

1. *The Handbook of Technical Writing, C. T. Brusaw, G. J. Alred, and W. E. Oliu, St. Martin's Press, 10th Edition, 2011.*
2. *Technical Writing: A Practical Guide for Engineers and Scientists, P. A. Laplante, CRC Press, 2011.*

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COST MANAGEMENT OF ENGINEERING PROJECTS

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: understand various Strategic Cost Management Process

CO2: Determine various stages of project execution.

CO3: Estimate the rate analysis and project cost control of the various items.

CO4: Understand the process of Break-even and profit Analysis.

CO5: Evaluate the Quantitative techniques for cost management.

UNIT – I

Introduction: Overview of the Strategic Cost Management Process Cost concepts in decision-making, Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System, Inventory valuation, Creation of a Database for operational control, Provision of data for Decision-Making.

UNIT – II

Project: meaning, Different types, why to manage, cost overruns centers, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities.

UNIT – III

Detailed Engineering activities: Pre project execution main clearances and documents Project team: Role of each member, Importance Project site: Data required with significance. Project contracts, Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

UNIT – IV

Cost Behavior and Profit Planning: Marginal Costing; Distinction between Marginal Costing and Absorption Costing. Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis.

UNIT –V

Total Quality Management and Theory of constraints: Activity-Based Cost Management, Bench Marking, Balanced Score Card and Value-Chain Analysis. Budgetary Control, Flexible Budgets, Performance budgets. Quantitative techniques for cost management, Linear Programming, PERT/CPM,

Textbooks:

1. *Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi*
2. *Charles T. Horngren and George Foster, Advanced Management Accounting*

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EARTHQUAKE RESISTANT DESIGN OF BUILDINGS

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Quantify mechanical behaviour of earth's surface, seismic hazards and its effects.
CO2: Identify the Conceptual design methods for solving engineering problems
CO3: Understand the internal parameters of the structures for seismic design source.
CO4: Assess the design component or process to meet desired needs within realistic constraints.
CO5: Analyse and design buildings to resist seismic forces.

UNIT – I

Engineering Seismology: Earthquake phenomenon cause of earthquakes – Faults – Plate tectonics – Seismic waves – Terms associated with earthquakes – Magnitude/Intensity of an earthquake – scales – Energy released – Earthquake measuring instruments – Seismoscope, Seismograph, accelerograph Characteristics of strong ground motions – Seismic zones of India.

UNIT – II

Conceptual design: Introduction – Functional planning – Continuous load path – Overall form – simplicity and symmetry – elongated shapes – stiffness and strength – Horizontal and Vertical members – Twisting of buildings – Ductility – definition – ductility relationships – flexible buildings – framing systems – choice of construction materials – unconfined concrete – confined concrete – masonry – reinforcing steel.

UNIT – III

Introduction to earthquake resistant design: Seismic design requirements – regular and irregular configurations – basic assumptions – design earthquake loads – basic load combinations – permissible stresses – seismic methods of analysis – factors in seismic analysis – equivalent lateral force method – dynamic analysis – response spectrum method – Time history method.

UNIT – IV

Reinforced Concrete Buildings: Principles of earthquake resistant deign of RC members Structural models for frame buildings – Seismic methods of analysis – Seismic deign methods – IS code based methods for seismic design – Seismic evaluation and retrofitting – Vertical irregularities – Plan configuration problems – Lateral load resisting systems – Determination of design lateral forces – Equivalent lateral force procedure – Lateral distribution of base shear..

UNIT –V

Structural Walls and Non-Structural Elements: Strategies in the location of structural walls – sectional shapes – variations in elevation – cantilever walls without openings – Failure mechanism of non – structures – Effects of non-structural elements on structural system – Analysis of non-structural elements – Prevention of non-structural damages – Isolation of non-structures.

1. 2. 3. 4. 5.

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Text books

3. *Earthquake Resistant Design of structures" – S. K. Duggal. Oxford University Press, 2012.*
4. *Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande. Prentice Hall of India Pvt. Ltd. 2008.*

References

1. *Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons, 2015.*
2. *Masory and Timber structures including earthquake Resistant Design – Anand S.Arya, Nemchand & Bros.2009*

Reference codes

1. *IS: 1893 (Part-1) -2016, "Criteria for Earthquake Resistant Design of structures." B.I.S., New Delhi.*
2. *IS: 4326-1993, "Earthquake Resistant Design and Construction of Building", Code of Practice B.I.S., New Delhi.*
3. *IS: 13920- 2016, "Ductile detailing of concrete structures subjected to seismic force" – Guidelines, B.I.S., New Delhi.*

1. 2. 3. 4. 5.

6. 7. 8. 9.

MOOC'S COURSES

It is instructed that a student has to opt minimum 12 week online courses to meet the required credit.

1. Introduction to Accounting and Finance for Civil Engineers
2. Development and Applications of Special Concretes
3. Geosynthetics And Reinforced Soil Structures
4. Maintenance and Repair of Concrete Structures
5. Advanced Topics in the Science and Technology of Concrete
6. Advanced Soil Mechanics
7. Soil Structure Interaction
8. Modern Construction Materials
9. Expansive Soil
10. Scheduling Techniques in Projects
11. Introduction to Lean Construction (Module 1 - Lean Basics)
12. Construction Methods and Equipment Management
13. Safety in construction
14. Plastic Analysis
15. Sub Structure Design

1. 2. 3. 4. 5.

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