K. K. Wagh Institute of Engineering Education and Research, Nashik

Department of Civil Engineering

Second Year B. Tech

Civil Engineering

Syllabus

Pattern: 2023

S.Y. B. Tech wef AY 2024-25																	
SEM-III																	
Course Code	**Course Type**	**Title of Course**	**Teaching Scheme**			**Evaluation Scheme and Marks**								**Credits**			
			TH	**TU**	**PR**	**INSEM**	**ENDSEM**	**CCE**	**TUT**	**TW**	**PR**	**OR**	**TOTAL**	**TH**	**TU**	**PR**	**TOTAL**
2300201C	BSC	Applied Mathematics & Computational Techniques	3	-	-	20	60	20	-	-	-	-	**100**	3	-	-	**3**
2304202	PCC	Mechanics of Structures	3	-	-	20	60	20	-	-	-	-	**100**	3	-	-	**3**
2304203	PCC	Architectural Planning and Design	3	-	-	20	60	20	-	-	-	-	**100**	3	-	-	**3**
2304204	PCC	Mechanics of Structures Lab	-	-	2	-	-	-	-	25	-	25	**50**	-	-	1	**1**
2304205	PCC	Architectural Planning and Design Lab	-	-	4				-	50	50	-	**100**	-	-	2	**2**
2304206	MDM	Hydraulics	3	-	-	20	60	20	-	-	-	-	**100**	3	-	-	**3**
2304207	MDM	Hydraulics Lab	-	-	2	-	-	-	-	25	-	25	**50**	-	-	1	**1**
2304208	OE	Disaster Management	2	-	-	-	-	50	-	-	-	-	**50**	2	-	-	**2**
2304209	VEC	Universal Human Values	-	2	-	-	-	-	50	-	-	-	**50**	-	2		**2**
2304210	VSEC	Project Scheduling & Execution	-	1	2	-	-	-	25	25	-	-	**50**	-	1	1	**2**
Total			**14**	**03**	**10**	**80**	**240**	**130**	**75**	**125**	**50**	**50**	**750**	**14**	**3**	**5**	**22**

S.Y. B. Tech wef AY 2024-25																
SEM-IV																
Course Code	**Course Type**	**Title of Course**	**Teaching Scheme**			**Evaluation Scheme and Marks**								**Credits**			
			TH	**TU**	**PR**	**INSEM**	**ENDSEM**	**CCE**	**TUT**	**TW**	**PR**	**OR**	**TOTAL**	**TH**	**TU**	**PR**	**TOTAL**
2304211	PCC	Concrete Technology	3	-	-	20	60	20	-	-	-	-	**100**	3	-	-	**3**
2304212	PCC	Surveying	3	-	-	20	60	20	-	-	-	-	**100**	3	-	-	**3**
2304213	PCC	Structural Analysis	3	-	-	20	60	20	-	--	-	-	**100**	3	-	-	**3**
2304214	PCC	Concrete Technology Lab	-	-	2	-	-	-	-	25	-	25	**50**	-	-	1	**1**
2304215	PCC	Surveying Lab	-	-	4	-	-		-	50	50	-	**100**	-	-	2	**2**
2304216	MDM	Remote Sensing & GIS	3	-	-	20	60	20	-	-	-	-	**100**	3	-	-	**3**
2304217	MDM	Remote Sensing & GIS Lab	-	-	2	-	-	-	-	25	-	25	**50**	-	-	1	**1**
2304218	OE	Earth Sciences	2	-	-	-	-	50	-	-	-	-	**50**	2	-	-	**2**
2304219	VEC	Democracy, Election & Governance	-	2	-	-	-	-	50	-	-	-	**50**	-	2	-	**2**
2304220	AEC	Technical Writing	-	1	2	-	-	-	25	25	-	-	**50**	-	1	1	**2**
Total			**14**	**03**	**10**	**80**	**240**	**130**	**75**	**125**	**50**	**50**	**750**	**14**	**3**	**5**	**22**

Civil Engineering Exit Courses (To award Diploma)														
Course Code	**Couse Type**	**Title of Course**	**Teaching Scheme**			**Evaluation Scheme and Marks**						**Credits**			
			TH	**TU**	**PR**	**INSEM**	**ENDSEM**	**CCE**	**TUT /TW**	**PR /OR**	**TOTAL**	**TH**	**TU**	**PR**	**TOTAL**
2304221	**EXIT**	Internship*	-	-	-	-	-	-	100	-	**100**	-	-	2	**2**
2304222	**EXIT**	Introduction to Reinforced Cement Concrete	2	-	2	20	30	-	50	-	**100**	2	-	1	**3**
2304223	**EXIT**	Estimation & Costing of Buildings	2	-	2	20	30	-	50	-	**100**	2	-	1	**3**
Total			**4**	**-**	**4**	**40**	**60**	**-**	**200**	**-**	**300**	**4**		**4**	**8**

*Internship in industry for 2-weeks
To get certificate student should get following credits

Internship	2 credits
Exit course-1	3 credits
Exit course-2	3 credits
Total credits	8 credits

SEMESTER III

S. Y. B. Tech.
Pattern 2023 Semester: III (B. Tech Civil Engineering)
2300201C : Applied Mathematics & Computational Techniques

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 Hrs./Week	**03**	**Continuous Comprehensive Evaluation: 20 Marks** **InSem Exam: 20 Marks** **EndSem Exam: 60 Marks**

Prerequisite Courses: - Linear Algebra, Vector algebra, Differential calculus and Integral calculus.

Course Objectives:

1.Find General solution of higher-order linear differential equation with constant & Variable coefficient using different Methods
2.Understand the different techniques of statistical Analysis, Use of probability and probability distribution
3.Recognize nature of vector fields, use of different vector differential operators & able to evaluate Line integrals & Work-done
4.Solve Numerical problems using different Numerical methods, heat equation, wave equation by separation of variables

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Define and understand basic concept of L.D.E, PDE, numerical techniques, Statistics, Probability and Vector Calculus.	2-Understanding
CO2	Solve the problems on LDE, PDE, vector calculus using appropriate method.	3- Apply
CO3	Apply Statistics, Probability distributions and numerical methods to solve real life problems.	3- Apply
CO4	Analyze complex engineering problems by using concepts of differential calculus, Statistics, Probability distributions and numerical methods.	4- Analyze
CO5	Evaluate the real life problems by using concepts of differential calculus, Statistics, Probability distributions and numerical methods.	5 -Evaluate

COURSE CONTENTS

Unit I	**Linear Differential Equations with Constant Coefficients**	**(08 Hrs.)**	**COs Mapped** **CO1, CO2, CO4,CO5**

LDE of n^{th} order with constant coefficients, Complementary Function, Particular Integral, General method, Shortcut methods, Method of variation of parameters, Cauchy's and Legendre's DE, Simultaneous and Symmetric simultaneous DE.

Unit II	**Applications of Linear Differential Equations & Partial Differential Equations**	**(07 Hrs.)**	**COs Mapped** **CO1, CO2, CO4,CO5**

Curvature, Modeling of Bending of beams, Wave equation, One and two dimensional Heat flow equations, Method of separation of variables. Applications of PDE to problems of Civil Engineering.

Unit III	**Vector Calculus**	**(07 Hrs.)**	**COs Mapped** **CO1, CO2, CO4,CO5**

Vector Differentiation: Physical interpretation of Vector differentiation, Vector differential operator,

Gradient, Divergence and Curl, Directional derivative, Solenoidal, Irrotational and Conservative fields, Scalar potential, Vector identities.
Vector Integration: Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence theorem, Stoke's theorem.

Unit IV	Statistics & Probability Distribution	(07 Hrs.)	COs Mapped CO1, CO3, CO4,CO5

Statistics: Measures of central tendency, Measures of dispersion, Coefficient of variation, Moments, Skewness and Kurtosis, Correlation and Regression.
Probability Distributions: Binomial, Poisson & Normal Distributions.

Unit V	Numerical Methods	(07 Hrs.)	COs Mapped CO1, CO3, CO4,CO5

Numerical Solutions of Algebraic and Transcendental equations: Bisection, Secant, Regula-Falsi, Newton-Raphson and Successive Approximation Methods, Convergence and Stability
Numerical Solutions of System of linear equations: Gauss elimination, LU Decomposition, Cholesky, Jacobi and Gauss Seidel Methods

Text Books

1. B.V. Ramana, " Higher Engineering Mathematics ", Tata McGraw-Hill.
2. B. S. Grewal, " Higher Engineering Mathematics ", Khanna Publication, Delhi.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd.

Reference Books

1. Advanced Engineering Mathematics,7e, by peter V.O. Neil(Thomson Learning)
2. P. N. Wartikar and J. N. Wartikar, "Applied Mathematics" (Volumes I and II), Pune VidyarthiGriha Prakashan, Pune.
3. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).
4. Advanced Engineering Mathematics with MATLAB, 2e, by Thomas L. Harman, James Dabney and Norman Richert (Brooks/Cole, Thomson Learning).

Strength of CO-PO Mapping

	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	--	--	--	--	--	--	--	--	--	2
CO2	3	2	1	--	1	--	--	--	--	--	--	2
CO3	3	2	1	--	1	--	--	--	--	--	--	2
CO4	3	2	1	1	1	--	--	--	--	--	--	2
CO5	3	2	1	1	1	--	--	--	--	--	--	2

Guidelines for Continuous Comprehensive Evaluation of Theory Course

Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	Tests on each unit using LMS (Each test for 15 M and total will be converted out of 05 M)	05
2	Problem solving through Computational Software	05
3	Tutorial (1 tutorial on each unit for 15 marks and total will be	05

	converted out of 05 M)	
4	Group Presentation on real life problem	05

Topics for Tutorial		
Sr. No.	**Title**	**CO Mapped**
1	Examples On LDE of nth order with constant coefficients.	**CO1, CO2, CO4,CO5**
2	Examples on Applications of differential equations.	**CO1, CO2, CO4,CO5**
3	Examples on Vector calculus.	**CO1, CO2, CO4,CO5**
4	Examples on statistics & Probability.	**CO1, CO3, CO4,CO5**
5	Examples on Numerical methods.	**CO1, CO3, CO4,CO5**

S. Y. B. Tech.
Pattern 2023 Semester: III (B. Tech Civil Engineering)
2304202 : Mechanics of Structures

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week **Practical (2304204) : 02 hrs/week**	**03** **01**	**Continuous Comprehensive Evaluation: 20Marks** **In Sem Exam: 20Marks** **End Sem Exam: 60Marks** **Term work (2304204): 25 Marks** **Oral Exam(2304204) : 25 Marks**

Prerequisite Courses, if any: - Fundamentals of Physics, Mathematics, Engineering Mechanics.

Course Objectives:
To apply the basic concepts of engineering mechanics in study of stress strain behavior of different materials
To understand the behavior of statically determinate structures and its further application in structural analysis

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Discuss the concept of stress-strain for elastic, plastic & brittle material and describe different type of stresses in determinate, indeterminate, homogeneous and composite structures	2-Understand
CO2	Sketch loading diagram, Shear Force Diagram (SFD) and Bending Moment Diagram (BMD).	3-Apply
CO3	Interpret bending and shear stresses and its applications for different cross sections	3-Apply
CO4	Apply theory of torsion to determine the stresses in circular shaft and Illustrate principal planes and principal stresses and its diagrammatic representation.	3-Apply
CO5	Analyze axially loaded and eccentrically loaded column.	4- Analyze.

COURSE CONTENT

Unit I	**Simple Stresses and Strains**	**(08 Hrs)**	**COs Mapped - CO1**

a) Materials used in construction ,concepts of stress and strains, Hook's Law, Stress-Strain Diagram for elastic, plastic materials and brittle material, Idealized stress-strain diagram, Concept of axial stresses (compression, tension), strains (linear, lateral, shear and volumetric), Elastic constants and their relations. Stresses and strains due to change in temperature and its applications in RC & Steel frame
b) Stresses, strains and deformations in bars of varying sections, composite sections(restricted to RCC Columns)

Unit II	**Shear Force and Bending Moment Diagram**	**(07 Hrs)**	**COs Mapped - CO2**

Concept of shear force and bending moment. Relation between shear force, bending moment and intensity of loading. Shear force and bending moment diagrams for determinate beams subjected to concentrated, uniformly distributed, uniformly varying loads and couples.

Unit III	**Shear and Bending Stresses**	**(07 Hrs)**	**COs Mapped – CO3**

a) Bending stresses in beams: theory of simple or pure bending, flexure formula, bending stress distribution diagrams, moment of resistance, section modulus, effect of moment of inertia & section modulus on moment of resistance of section.
b) Shear stresses in beams: concept of shear, complimentary shear, derivation of shear stress formula, shear stress distribution. Maximum and average shear stress for circular and rectangular sections.

Unit IV	Theory of Torsion and Principal stresses and strains	(07 Hrs)	COs Mapped – CO4

a)Torsion Theory, concept, assumptions, stresses and strains due to torsion, concept of torsion in building frame
b) Principal stresses and strains: principal planes and principal stresses, normal and shear stresses on an oblique plane, magnitude and orientation of principal stresses and maximum shear stress.

Unit V	Axially and Eccentrically Loaded Columns.	(07 Hrs)	COs Mapped – CO5

a) Axially loaded columns: concept of critical load and buckling, Euler's formula for buckling load, Rankine's formula, safe load on column and limitations of Euler's formula.
b) Direct and bending stresses for eccentrically loaded short columns. Concept of core of section for solid and hollow rectangular and circular sections.

Text Books

1. Strength of Materials by S. S. Ratan, Tata McGraw Hill.
2. Strength of Materials by S Ramamrutham, Dhanpatrai Publishing Company, New Delhi
3. Mechanics of Structures Vol. I &II by S. B. Junnarkar and Dr. H. J. Shah, Twenty second edition, Charotar Publishing House Pvt Ltd.
4. Strength of Materials by R. Subramanian, Oxford University Press.

Reference Books

1. Mechanics of Materials by Beer and Johnston, McGraw Hill Publication.
2. Intermediate Structural Analysis by R. C. Hibbler, Pearson Education Publishers.
3. Mechanics of Materials by Gere & Timoshenko, CBC publisher.
4. Introduction to Mechanics of Solids by E.P. Popov, Prantice Hall Publication.

Strength of CO-PO Mapping

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	3	3	3	3	3	-	-	-	-	2	-	3	3	-
CO2	3	3	3	3	3	-	-	-	-	2	-	3	3	-
CO3	3	3	3	3	3	-	-	-	-	2	-	3	3	-
CO4	3	3	3	3	3	-	-	-	-	-	-	3	3	-
CO5	3	3	3	3	3	-	-	-	-	-	-	3	3	-
Average	3	3	3	3	3	-	-	-	-	2	-	3	3	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course

Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	Assignments on Unit-1 to Unit-4	15
2	LMS Test on Each Unit	05
	Total	**20**

S. Y. B. Tech.
Pattern 2023 Semester: III (B. Tech Civil Engineering)
2304203: Architectural Planning and Design

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :03 hrs/week **Practical(2304205): 04 hrs/week**	**03** **02**	**Continuous Comprehensive Evaluation: 20 Marks** **In Sem Exam: 20 Marks** **End Sem Exam: 60 Marks** **Term work(2304205): 50 Marks** **Practical Exam(2304205) : 50 Marks**

Prerequisite Courses, if any: - Fundamentals of Engineering Graphics, Basic information of Materials used in construction

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Identify types of building and basic requirements of building components.	2-Understand
CO2	Understand different Legal aspects	2-Understand
CO3	Make use of Architectural Principles and Building byelaws for building construction.	3-Apply
CO4	Plan effectively various types of Residential and Public Building according to their utility, functions with reference to National Building Code.	3-Apply
CO5	Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects.	3-Apply

COURSE CONTENTS

Unit I	**Introduction to Building Construction**	**(08 Hrs)**	**COs Mapped - CO1**

Introduction to Building Construction– Definition, Types of Building as per National Building Code.
Types and their requirements - Sub structure, super structure, door, window, arch, flooring and roofing
Masonry– Introduction to types of masonry (Brick, stone), Types of bonds, construction procedure, and supervision.
Form-work: Introduction and Type, Types of scaffolding

Unit II	**Building Byelaws and Introduction to Architectural Considerations**	**(07 Hrs)**	**COs Mapped – CO2, CO3**

Building Byelaws: Necessity of bye-laws, plot sizes, road width, opens spaces, floor area ratio (F.A.R.),floor Space Index(FSI), Type of FSI, Concept of Volume Plot Area Ration (V.P.R.), Marginal distances, building line, control line, height regulations, Area calculations (built-up area, carpet area), Rules for ventilation, lighting, Vertical circulation, Sanitation and Parking of vehicles.
Introduction to Architectural Considerations: Principles of Building Planning and Architectural planning Abbreviations and Symbols as per IS 962-1989.
Elements of perspective drawings - Parallel and Angular type.

Unit III	**Architectural Planning and Drawing**	**(07 Hrs)**	**COs Mapped – CO3, CO4, CO5**

Residential Buildings - Functional requirements and dimensions (Room Specification), Line Plan, Developed Plan, Elevation and Sectional Elevation.
Type and Design of staircase: Dog legged /Quarter turn.
Public Building- Functional requirements and dimensions.
Green Building- Salient features, planning concepts and rating systems of Green Building.

Unit IV	**Plumbing, Protective Coatings and Recent Trends in**	**(07 Hrs)**	**COs Mapped – CO1, CO4**

	Architectural Planning		

Plumbing: Introduction; Components; Materials used and Systems of plumbing
Protective Coatings: Plastering; Painting
Recent trends in building Construction: Light weight construction, Mivan Constructions, Compact House
Introduction to automation in construction

Unit V	**Town Planning and Legal Aspects**	**(07 Hrs)**	**COs Mapped – CO2**

Necessity of town planning, Land use zoning, Aspects of zoning, N.A. Sanction procedure.
List of documents from commencement to completion to be submitted to local authority. 7/12 abstract, Form 6 and its types, Concept of Transferable Development Rights (TDR).
Development plan and its importance, Maharashtra Regional and Town Planning (MRTP) Act, Real Estate Regulatory Authority (RERA),

Text Books

1. Building Construction by B.C. Punmia, Laxmi Publications.
2. Building Materials by S.V.Deodhar, Khanna Publication.
3. Building Construction by S.C. Rangwala, Charotdar Publications.
4. Building Construction by Bindra and Arora, Dhanpat Rai Publications.
5. Building Drawings with an integrated Approach to Built-Environment by M. G. Shah, C. M. Kale and S. Y. Patki, New Delhi, Tata McGraw Hill. (5th edition.)

Reference Books

1. Building Materials by S. K. Duggal, New Age International Publishers.
2. Building Materials Technology by Ruth T. Brantley & L. Reed Brantley, Tata McGraw Hill.
3. National Building Code (NBC-2005)
4. I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings.
5. Development plan and DCP Rules of urban local body, New Delhi, Volume 12.
6. Maharashtra Regional and Town Planning (MRTP) Act-1966
7. Architectural Detailing: Function, Constructability, Aesthetics by Edward Allen and Patrick Rand

	Strength of CO-PO/PSO Mapping													
	PO												**PSO**	
CO 1	1	1	2	1	-	2	1	1	-	-	-	1	-	-
CO 2	-	-	-	-	1	2	1	2	1	1	1	-	-	-
CO 3	-	-	-	1	3	1	3	1	2	2	1	2	2	-
CO 4	-	-	-	1	1	2	2	2	2	2	2	2	2	1
CO 5	2	1	2	-	-	2	-	2	1	1	1	1	2	-
Average	2	1	2	1	1	2	2	2	2	2	1	2	2	1

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Assignments on Unit-1 to Unit-4	15
3	LMS Tests	05
	Total	**20**

S. Y. B. Tech.
Pattern 2023 Semester: III (B. Tech Civil Engineering)
2304204 : Mechanics of Structures Lab

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical : 02 hrs/week	**01**	**Term work: 25 Marks** **Oral Exam : 25 Marks**

Prerequisite Courses, if any: - Fundamentals of Physics, Mathematics, Engineering

Course Objectives:

1. To apply the basic concepts of engineering mechanics in study of stress strain behavior of different materials
2. To understand the behaviour of statically determinate structures and its further application in structural analysis

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Estimate the compressive, tensile, flexural strength of various materials used in constructions like steel, timber, plywood, bricks and tiles	2-Understand
CO2	Apply the acquired knowledge to ensure quality of materials as per specifications prescribed in Indian standard codes.	3-Apply
CO3	Analyse the structural behaviour of materials under various loading configurations.	4- Analyse
CO4	Evaluate the test results with the relevance of their field applications	5- Evaluate

List of Laboratory Experiments / Assignments

Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Tension Test on TMT Steel	**CO1, CO2, CO3, CO4**
2	Shear Test on Mild Steel	**CO2, CO3, CO4**
3	Compression Test on Timber	**CO1, CO2, CO3, CO4**
4	Bending Test on Timber	**CO1, CO2, CO3, CO4**
5	Compressive Strength Test of Bricks	**CO1, CO2, CO3, CO4**
6	Water Absorption Test on Bricks	**CO2, CO4**
7	Efflorescence Test on Bricks	**CO2, CO4**
8	Flexural Strength of Flooring Tiles	**CO1, CO2, CO3, CO4**
9	Abrasion Test of Flooring Tiles	**CO2, CO4**
10	Material survey – steel, timber, plywood, bricks and tiles	**CO2, CO4**

Guidelines for Laboratory Conduction
1. Teacher will brief the given experiment to students its procedure, observations, calculations and outcome of the experiment. 2. Apparatus and equipments required for the allotted experiment will be provided by the lab assistants. 3. Students will perform the allotted experiment under the supervision of faculty and lab assistant.
Guidelines for Student's Lab Journal
Write-up should include title, aim, diagram, procedure, observations, graphs, calculations, conclusion and questions, if any.
Guidelines for Termwork Assessment
1. Each experiment from lab journal is assessed for 30 marks based on three rubrics. 2. Rubric R-1 for timely completion, R-2 for understanding and R-3 for presentation/journal writing where each rubric carries 10 marks.

S. Y. B. Tech. **Pattern 2023 Semester: III (B. Tech Civil Engineering)** **2304205 : Architectural Planning and Design Lab**		
Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical: 04 hrs/week	**02**	**Term work: 50 Marks** **Practical Exam: 50 Marks**
Prerequisite Courses, if any: - Fundamentals of Engineering Graphics, Basic information of Materials used in construction		
Course Outcomes: On completion of the course, students will be able to–		

	Course Outcomes	**Bloom's Level**
CO1	Identify types of building and basic requirements of building components.	2-Understand
CO2	Understand different Legal aspects	2-Understand
CO3	Make use of Architectural Principles and Building byelaws for building construction.	3-Apply
CO4	Plan effectively various types of Residential and Public Building according to their utility, functions with reference to National Building Code.	3-Apply
CO5	Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects.	3-Apply

List of Laboratory Experiments / Assignments

Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	To prepare submission drawing for residential building with furniture arrangement.	CO3, CO4
2	Developing floor plan of G+1 Residential building with electric layout using software (Ref. to Assignment 1)	CO3, CO4
3	To prepare foundation plan for residential building. (Ref. to Assignment 1)	CO1, CO3
4	To prepare the layout for water supply, drainage with Septic tank and rainwater harvesting. (Ref. to Assignment 1)	CO3, CO4
5	Drawing the Elevation and section of Door (6 paneled double shutter wooden door), Window (Sliding Window) and Arch (Semi-circular) using software	CO1
6	To prepare perspective drawing of a small building element.	CO3
7	Two line plans of Public Building (on graph paper)	CO3, CO4, CO5
8	Site Visit: Any on-going Construction Site of Residential Building (Apartment).	CO1, CO2 CO3, CO4, CO5
9	Site Visit: Green Building	CO1, CO2 CO3, CO4, CO5
10	Collection of list documents to be submitted to municipal corporation at different stages of construction (submission, commencement, completion, occupancy, possession. NOC etc.)	CO3, CO4, CO5

Guidelines for Laboratory Conduction

1. Teacher will brief the given assignment to students along with its procedure, tools, and outcome.
2. Students will perform the allotted practical individually under the supervision of faculty.
3. After performing the practical students will check their sheets from the teacher on given time.

Guidelines for Student's Lab Sheets
Sheets must be neat and clean. Every information in sheet should be filled properly. (like- name of sheet, scale, name of student, etc.)
Guidelines for Termwork Assessment
1. Each experiment from given syllabus is assessed for thirty marks based on three rubrics. 2. Rubric R-1 for Timely Completion, R-2 for Understanding and R-3 for Presentation/sheets drawing where each rubric carries Ten marks.

S. Y. B. Tech.
Pattern 2023 Semester: III (B. Tech Civil Engineering)
2304206: Hydraulics

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week **Practical (2304207) :02 hrs/week**	**03** **01**	**Continuous Comprehensive Evaluation: 20 Marks** **In Sem Exam: 20 Marks** **End Sem Exam: 60 Marks** **Term work (2304207) : 25 Marks** **Oral Exam (2304207): 25 Marks**

Prerequisite Courses, if any: - Fundamentals of Engineering Mechanics, Engineering Mathematics and Engineering Physics.

Course Objectives:

1. To gain a thorough understanding of the fundamentals of Fluid Mechanics, the characteristics of Fluids and the concept of submerged and buoyant objects in a static fluid.
2. To utilize the principles of continuity, momentum and energy in the context of fluid motion.
3. To apply the fundamental principles of Fluid Mechanics to solve real-world civil engineering problems

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	To recall the basic fluid properties and state concepts of buoyancy.	1.Remember
CO2	Identify the various pressure measuring devices and explain the various numbers in dimensional analysis.	2.Understand
CO3	Discuss the equations in fluid kinematics and fluid dynamics.	2.Understand
CO4	Describe Laminar and turbulent flow and recognize its characteristics.	2.Understand
CO5	Solve the practical problems involving flow through pipes.	3.Apply

COURSE CONTENTS

Unit I	**Introduction to hydraulics and Flotation**	**(08 Hrs)**	**COs Mapped - CO1**

Definition of fluid and fluid mechanics: Examples and practical applications involving fluids at rest and in motion. Physical properties of fluids: density, specific weight, specific volume, relative density, and viscosity. Newton's law of viscosity, classification of fluids, rheological diagram, dynamic and kinematic viscosity, compressibility, cohesion, adhesion, surface tension, capillarity, vapor pressure. Problems involving the use of the above fluid properties.

Principle of flotation and buoyancy, equilibrium of floating and submerged bodies, stability of floating and submerged bodies. Metacenter and metacentric height and its determination (experimental and analytical methods).

Unit II	**Hydro Statics and DimensionalAnalysis**	**(07 Hrs)**	**COs Mapped - CO2**

The basic equation of hydrostatics, the concept of pressure head, measurement of pressure (absolute, gauge), application of the basic equation of hydrostatics, pressure measuring devices (simple manometers, differential manometers: U-tube, inclined, mechanical gauges, center of pressure, total pressure on plane and curved surfaces,

Dimensions of physical quantities, dimensional homogeneity, dimensional analysis using Buckingham's π theorem method, geometric, kinematic, and dynamic similarity, important dimensionless parameters (Reynolds number, Froude number, Euler number, Mach number, and Weber number) and their significance, model laws (Froude's Law and Reynolds' Law).

Unit III	**Fluid Kinematics And Hydrodynamics**	**(07 Hrs)**	**COs Mapped - CO3**

Eulerian and Lagrangian approach, velocity and acceleration, and their components in Cartesian coordinates, Continuity equation, momentum equation, Energy equation, Classification of flows, stream line, stream tube, path line, streak line, velocity potential, stream function and flow net.

Forces acting on a fluid mass in motion, Euler's equation of motion along a streamline, and its integration; assumptions of Bernoulli's equation; Modified Bernoulli's equation, its applications, and limitations; hydraulic grade line and total energy line. Linear momentum equation and kinetic energy correction factor; momentum correction factor (only information).

Venturi meter, orifice, and orifice meter, hydraulic coefficients for orifice, Pitot tube.

Unit IV	**Laminar Flow and Turbulent Flow**	**(07 Hrs)**	**COs Mapped – CO4**

Reynolds experiment, laminar flow through a circular pipe, flow between two fixed parallel plates, methods of measurement of viscosity (Newton's Law of Viscosity: Rotating cylinder viscometer, Stokes' law, Hagen Poiseuille Equation: Redwood Viscometer, Darcy's law, Transition from laminar to turbulent flow).

Introduction of turbulent flow, Characteristics of flow, instantaneous velocity, temporal mean velocity.

Unit V	**Flow Through Pipes**	**(07 Hrs)**	**COs Mapped - CO5**

Flow through pipes: energy losses in pipe flow (major losses and minor losses); Darcy-Weisbach Equation; variation of friction factor for laminar flow and turbulent flow; resistance to flow in smooth and rough pipes.

Text Books

1. Hydraulics and Fluid Mechanics including Hydraulic Machine by Dr P. N. Modi & S. M. Seth Pub: Standard book house, Delhi-6
2. Flow in Open Channels by K Subramanya, Pub: Tata McGraw Hill, New Delhi 3. A Text Book on Fluid Mechanics and Hydraulic Machines by Sukumar Pati Pub: McGraw Hill, New Delhi

Reference Books

1. Engineering Fluid Mechanics by R. J. Garde and A.J Mirajgaonkar, Pub: SCITECH Publications(India)Pvt.Ltd, Chennai
2. Fluid Mechanics and its Applications, Vijay Gupta, Santosh K Gupta, New Age international pvt. Ltd, New Delhi,
3. Fluid Mechanics, Fundamentals and applications by Yunus. A Cengel and John.M Cimbala, Mc Graw Hill International, New Delhi.
4. Fluid Mechanics by Streeter, Wylie and Bedford – Pub: McGraw Hill International, New Delhi.
5. Open Channel Hydraulics by Ven Tee Chow, Pub: Mcgraw- Hill Book Company- Koga.
6. A Text Book of Fluid Mechanics and Hydraulic Machines- by Dr. R K Rajput Pub: S Chand and Co Ltd. New Delhi

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	1	--	--	--	--	--	--	1	--	--
CO2	3	3	3	1	1	1	--	--	--	--	--	1	1	2
CO3	3	3	3	1	1	--	--	--	--	--	--	1	--	--
CO4	3	3	3	2	2	--	--	--	--	--	--	1	2	--
CO5	--	--	2	3	3	--	--	--	3	--	--	3	3	3
Average	**3.0**	**3.0**	**2.80**	**2.0**	**1.6**	**1.5**	**1.0**	**--**	**2.50**	**3.0**	**2.00**	**1.67**	**2.0**	**2.0**

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Assignments on Unit-1 to Unit-4	15
2	LMS Tests	05
	Total	**20**

K. K. Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. B. Tech.
Pattern 2023 Semester: III (B. Tech Civil Engineering)
2304207 : Hydraulics Lab

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical : 02 hrs/week	**01**	**Term work: 25 Marks** **Oral: 25 Marks**

Prerequisite Courses, if any: - Fundamentals of Engineering Mechanics, Engineering Mathematics and Engineering Physics.

Course Objectives:

1. To understand conceptually the properties of fluid, fluid statics, fluid kinematics and fluid dynamics, dimensional analysis, boundary layer theory, open channel flow and fluid flow around submerged objects.
2. To apply principles of continuity, mass, momentum and energy as applied to fluid at rest as well as for fluid flow in open channel.
3. To apply fundamental principles of fluid mechanics for the solution of practical Civil Engineering problems.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	To recall the basic fluid properties and state concepts of buoyancy.	1.Remember
CO2	Identify the various pressure measuring devices and explain the various numbers in dimensional analysis.	2.Understand
CO3	Discuss the Bernoulli's equation and uses of venturimeter.	2.Understand
CO4	Describe Laminar and turbulent flow and recognize its characteristics.	2.Understand
CO5	Solve the practical problems involving boundary layer theory and flow through pipes.	3.Apply

List of Laboratory Experiments / Assignments

Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Measurement of viscosity of fluid by Redwood viscometer.	**CO1**
2	Measurement of pressures using different pressure measuring devices	**CO2,CO3**
3	Determination of stability of floating bodies using ship models.	**CO1**
4	Calibration of Venturimeter / Orifice meter.	**CO2**
5	Transition of Laminar and turbulent flow through pipes.	**CO4**
6	Experimental verification of Bernoulli's theorem with reference to loss of energy	**CO3**
7	Determination of major/minor losses in a friction factor /pipe system for a given pipe.	**CO5**
8	Demonstration of fluid flow through appropriate VCD/Audio visual / PPT's/ Software.	**CO5**

Guidelines for Laboratory Conduction
1. Teacher will brief the given experiment to students its procedure, observations calculation, and outcome of this experiment. 2. Apparatus and equipment's required for the allotted experiment will be provided by the lab assistants using SOP. 3. Students will perform the allotted experiment in a group (two students in each group) under the supervision of faculty and lab assistant. 4. After performing the experiment students will check their readings, calculations from the teacher. 5. After checking they have to write the conclusion of the final result.
Guidelines for Student's Lab Journal
Write-up should include title, aim, and diagram, working principle, procedure, observations, graphs, calculations, conclusion and questions, if any.
Guidelines for Term work Assessment
1. Each experiment from lab journal is assessed for thirty marks based on three rubrics. 2. Rubric R-1 for timely completion, R-2 for understanding and R-3 for presentation/journal writing where each rubric carries ten marks.

K. K. Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. B. Tech.
Pattern 2023 Semester: III (B. Tech Civil Engineering)
2304208 : Disaster Management

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :02 hrs/week	**02**	**Continuous Comprehensive Evaluation: 50 Marks**

Prerequisite Courses, if any:-The basic knowledge of Engineering Mathematic, Physics.

Course Objectives:

1. To understand the fundamental concepts of disaster management and their relevance to civil engineering projects.
2. To develop skills in assessing and implementing disaster preparedness and mitigation strategies in civil engineering contexts.
3. To enhance the ability to evaluate and propose effective response and recovery plans for civil engineering projects following disasters.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Define and classify different types of disasters and understand their implications on civil engineering projects.	2-Understand
CO2	Analyze the causes and effects of disasters, identifying vulnerabilities in civil infrastructure and assessing risk factors.	4-Analyze
CO3	Assess and apply appropriate disaster preparedness and mitigation strategies, including hazard mapping and emergency planning, to mitigate the impact of disasters on civil engineering projects.	3-Apply
CO4	Evaluate response and recovery strategies for civil engineering projects post-disaster, contributing to sustainable reconstruction and enhancing community resilience efforts.	4-Evaluate

COURSECONTENTS

Unit I	**Fundamentals of Disaster Management**	**(08 Hrs.)**	**COs Mapped- CO1.**

Overview of different types of disasters and their classification, Impacts of Natural and Man-Made Disasters on Civil Infrastructure, Identifying Vulnerabilities in Civil Engineering Projects, Strategies for addressing vulnerabilities and enhancing project resilience.

Unit II	**Disaster Preparedness and Mitigation Strategies**	**(08 Hrs.)**	**COs Mapped- CO2.**

Assessing Preparedness and Mitigation Measures, Hazard Mapping and Emergency Planning for Civil Engineering Projects, Integration of resilience measures into project design and construction, Application of techniques to enhance project durability and safety.

Unit III	**Response and Recovery Planning**	**(08 Hrs)**	**COs Mapped - CO3, CO4.**

Evaluating Response and Recovery Strategies for Civil Engineering Projects, Contributing to Sustainable Reconstruction and Community Resilience, Learning from Past Disasters (Case Studies).

Text Books

1. Haddow, G., Bullock, J., & Coppola, D. (2017). Introduction to Emergency Management (6th ed.). Butterworth-Heinemann.
2. Paton, D., & Johnston, D. (2017). Disaster Resilience: An Integrated Approach. Charles C Thomas Publisher.
3. Fagel, M. J. (2017). Principles of Emergency Management and Emergency Operations Centers (EOC) (2nd ed.).
4. CRC Press.Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.

Reference Books

1. Andharia J. Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper No. 8, 2008.
2. Govt. of India: Disaster Management Act 2005, Government of India, New Delhi.

Strength of CO-PO Mapping

	PO												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	2	2	-	-	2	-	2	-	-	-	-	3	-	-
CO2	3	3	-	-	3	-	2	-	-	-	-	3	-	-
CO3	3	3	-	2	3	-	3	-	-	-	-	3	3	2
CO4	3	3	3	-	3	3	3	-	-	3	-	3	3	3
Average	2.8	2.8	3	2	2.8	3	2.6	-	-	3	-	3	3	2.5

Guidelines for Continuous Comprehensive Evaluation of Theory Course

Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Assignments on unit-1 to 3.	20
2	Presentation on selected topic (Individual)	20
3	LMS Tests	10
	Total	**50**

K. K. Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. B. Tech.
Pattern 2023 Semester: III (B. Tech Civil Engineering)
2304209: Universal Human Values

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Tutorial : 02 hrs/week	**02**	**Tutorial: 50 Marks**

Prerequisite Courses, if any: - NA

Course Objectives:

- To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of theHuman reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Thus, this course is intended to provide a much-needed orientation input in value education to the young enquiring minds.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	**Apply** the understanding of ethical conduct to formulate the strategy for ethical life and profession.	3.Apply
CO2	**Examine** the role of a human being in ensuring harmony in society and nature.	4.Analyze
CO3	**Analyze** the value of harmonious relationship based on trust and respect in their life and profession	4.Analyze
CO4	**Distinguish** between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intentionand Competence of an individual.	4.Analyze
CO5	**Evaluate** the significance of value inputs in formal education and start applying them in their life and profession	5. Evaluate

COURSE CONTENTS

Unit I	**Introduction-Basic Human Aspiration, its fulfilment through All-encompassing Resolution**	**(05 hrs)**	**COs Mapped – CO1**

The basic human aspirations and their fulfilment through Right understanding and Resolution, Right understanding and Resolution as the activities of the Self, Self being central to Human Existence; All-encompassing Resolution for a Human Being, its details and solution of problems in the light of Resolution

Unit II	**Right Understanding (Knowing)- Knower, Known & the Process**	**(05 hrs)**	**COs Mapped –CO 2**

The domain of right understanding starting from understanding the human being (the knower, the experiencer and the doer) and extending up to understanding nature/existence – its interconnectedness and co-existence; and finally understanding the role of human being in existence (human conduct).

Unit III	Understanding Human Being	(05 hrs)	COs Mapped –CO 3

Understanding the human being comprehensively as the first step and the core theme of this course; human being as co-existence of the self and the body; the activities and potentialities of the self; Basis for harmony/contradiction in the self

Unit IV	Understanding Nature and Existence	(05 hrs)	COs Mapped –CO 4

A comprehensive understanding (knowledge) about the existence, Nature being included; the needand process of inner evolution (through self-exploration, self-awareness and self-evaluation), particularly awakening to activities of the Self: Realization, Understanding and Contemplation in the Self (Realization of Co-Existence, Understanding of Harmony in Nature and Contemplation ofParticipation of Human in this harmony/ order leading to comprehensive knowledge about the existence).

Unit V	Understanding Human Conduct, All-encompassing Resolution & Holistic Way of Living	(04 hrs)	COs Mapped –CO 5

Understanding Human Conduct, different aspects of All-encompassing Resolution (understanding, wisdom, science etc.), Holistic way of living for Human Being with All-encompassing Resolution covering all four dimensions of human endeavor viz., realization, thought, behavior and work (participation in the larger order) leading to harmony at all levels from Self to Nature and entire Existence

Text Books

1. R R Gaur, R Asthana, G P Bagaria, 2019 (2nd Revised Edition), A Foundation Course inHuman Values and Professional Ethics. ISBN 978-93-87034-47-1, Excel Books, New Delhi.

Reference Books

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limitsto Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya EkParichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
9. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists &Engineers, Oxford University Press
10. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Mode of Evaluation

Based on participation of student in classroom discussions/Self-assessment/Peer assessment/Assignments/ Seminar/Continuous Assessment Test/Semester End Exam
Socially relevant project/Group Activities/Assignments may be given importance in this course

Guidelines for Continuous Assessment of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Assignment on Unit 1,2	**30**
2	Group presentations on Unit 3	**10**
3	LMS test on each unit	**10**
	Total	**50**

S. Y. B. Tech.
Pattern 2023 Semester: III (B. Tech Civil Engineering)
2304210: Project Scheduling & Execution

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Tutorial :01 hr/week **Practical :02 hrs/week**	**01** **01**	**Term work : 25 Marks** **Tutorial : 25 Marks**

Prerequisite Courses, if any: -- Fundamentals of Management, Indian Construction Industry and Economics.

Course Objectives:

1. To provide students with a comprehensive understanding of the principles and practices of project planning and execution.
2. To equip students with the necessary skills to effectively use project management software tools for planning and executing projects.
3. To emphasize the importance of safety codes and precautions during the execution of a project.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Understand the role of a Civil Engineer in project execution, including the use of project management software and the importance of safety precautions.	2. Understand
CO2	Apply project management principles and scheduling methods for project planning and control.	3.Apply

COURSE CONTENTS

Unit I	**Introduction to Project Planning**	**(06 hrs)**	**COs Mapped - CO1**

- Project Management: Definition, Application and Basic Concepts , Causes of project delay; Behavioral aspects of project management; Role of project manager; Attributes of a successful project manager Project Life Cycle ; Project Scheduling Methods : Bar Chart, Milestone Chart; Network Analysis using CPM and PERT; Introduction to Project Management Softwares: Microsoft Project, Primavera

Unit II	**Project Execution**	**(06 hrs)**	**COs Mapped - CO2**

Role of Civil Engineer in Project Execution, Site Layout: Components, Examples of Site Layout, Selection and Management of Construction Materials, Project reporting, Project Cash flows: elements, principles, estimation, Financial closure, Safety codes, Safety precautions during execution of project, PPE.

Text Books

1. Project planning and Control with PERT and CPM by DR. B.C. Punmia and K.K.Khandelwal Publisher: Firewall Media, Laxmi publication New Delhi.
2. Construction Project Management-Planning, Scheduling and Controlling by K. K. Chitkara, Tata McGraw Hill Publishing Company, New Delhi

Reference Books

1. Project management Principles and Techniques by B.B. Goel Publisher: Deep and Deep publisher.
2. Construction Management and Planning by B. Sengupta and H. Guha, Tata McGraw Hill Publishing Company, New Delhi.
3. The Essentials of Project Management by Dennis Lock, Gower Publishing Ltd. UK.
4. Essentials for Decision Makers by Asok Mukherjee, Scitech Publication, New Delhi
5. Total Quality Management - Dr. S.Rajaram and Dr. M. Sivakumar—Biztantra
6. Total Engineering Quality Management – Sunil Sharma – Macmillan India Ltd.
7. Manual on Project Formulation by ITTO
8. Projects by Prassana Chandra. McGraw Hill Publications
9. Project Management by K. Nagrajan. New Age International Publishers
10. Project Management by A. Kanda. PHI Learning Pvt. Ltd. 2011

Strength of CO-PO Mapping

	PO												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	-	2	1	-	1	-	1	2	2	3	-	3	-	-
CO2	-	2	1	-	1	-	1	2	2	3	-	3	-	-
Average	-	2	1	-	1	-	1	2	2	3	-	3	-	-

List of Assignments/TW

Sr. No.	**Assignments**	**CO Mapped**
1	Assignment on Identification of various activities of a small construction project.	**CO1**
2	Assignment on calculation of duration of various activities of construction project Bar Chart.	**CO1**
3	Assignment on construction of GANTT chart / Bar chart for a residential construction project	**CO1**
4	Assignment on preparation of Critical Path network of a construction project	**CO1**
5	Assignment on Network Analysis using Critical Path Method.	**CO1**
6	Assignment on Network Analysis using PERT	**CO1**
7	Preparation of Site layout of multistoried building	**CO2**
8	Group discussion in most recent development in project execution and planning	**CO2**
9	A seminar on any topic from the syllabus and latest trend in project planning and execution	**CO1,CO2**
10	Visit to construction site Residential/Industrial/commercial building	**CO1,CO2**

Guidelines for Term work Course		
Sr. No.	**Components Term work**	**Marks Allotted**
1	Assignments on Unit-1 to Unit-2	30
2	LMS Tests	20
	Total	**50**

SEMESTER IV

S. Y. B. Tech.
Pattern 2023 Semester: IV (B. Tech Civil Engineering)
2304211: Concrete Technology

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week **Practical (2304214) : 02 hrs/week**	**03** **01**	**Continuous Comprehensive Evaluation: 20 Marks** **In Sem Exam: 20 Marks** **End Sem Exam: 60 Marks** **Term work(2304214): 25 Marks** **Oral Exam(2304214): 25 Marks**

Prerequisite Courses, if any: -

Course Objectives:

1. To know the properties of various ingredients of concrete and concept of mix design
2. To learn the behavior of concrete both in its fresh and hardened state.
3. To understand special concretes and their application.
4. To explain deterioration of concrete and study the methods of repair.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Discuss concrete as a construction material and get acquainted with the ingredients of concrete like cement, sand, aggregates and admixtures.	2. Understanding
CO2	Describe various concreting techniques, special concretes and concrete handling equipments.	2. Understanding
CO3	Identify and Evaluate the properties of fresh concrete.	3. Applying
CO4	Understand the deteriorations in concrete and categorize different methods and techniques for repairing it.	3. Applying
CO5	Perform concrete mix design of normal concrete grade.	4. Analyze

COURSE CONTENTS

Unit I	**Components of Concrete**	**(08 Hrs)**	**COs Mapped - CO1**

Cement and aggregate – Historical note, manufacture of Portland cement, basic chemistry, hydration, physical and mechanical properties, classification, types, application of cement, tests on cement – field tests & laboratory tests.
Aggregate: Classifications, Source, mechanical properties, physical properties, deleterious materials, soundness, Alkali – aggregate reaction, Tests on aggregates.
Water and admixtures – Quality of water for use in concrete, mixing water, curing water, tests on water. Admixtures: functions, classification, role, types: mineral and chemical like accelerators, retarders, plasticizers, super plasticizers, mineral admixtures – fly ash, silica fume, ground granulated blast furnace slag.

Unit II	**Fresh and Hardened Concrete**	**(07 Hrs)**	**COs Mapped – CO1,CO2, CO3**

Fresh concrete: water – cement ratio, process of manufacturing fresh concrete – batching, mixing, transportation, placing, compaction, curing of concrete, curing methods, workability – factors affecting

workability, cohesion and segregation, Bleeding, Laitance, workability tests by slump cone, compaction factor, Vee – Bee consistometer and flow table apparatus, Effect of admixture on workability of concrete and optimum dosage of admixture by Marsh cone test, Influence of temperature, maturity rule.

Hardened concrete: Strength of concrete, factors affecting strength, micro – cracking and stress – strain relationship, other strength properties, relation between tensile and compression strength, impact strength, abrasion resistance, elasticity and creep, shrinkage and swelling. Destructive tests – compression strength on cube and cylinder, flexural strength, indirect tensile strength, core test. Nondestructive tests: rebound hammer, ultrasonic pulse velocity

Unit III	**Concrete Mix Design**	**(07 Hrs)**	**COs Mapped – CO5,CO1**

Concept and objectives of concrete mix design, factors to be considered, factors affecting the mix design, factors for proportioning of concrete, Statistical quality control, variability of laboratory trial mixes test result and guidelines to improve mix, acceptance criteria, Grade designation and I.S. requirements as per I.S. 456 (Exposure conditions, minimum & maximum cement content and maximum W/C ratio),I.S code method by 10262 and D.O.E. method (with and without mineral admixture)

Unit IV	**Concreting Equipment's, Techniques and Special Concretes**	**(07 Hrs)**	**COs Mapped - CO3, CO2,CO1**

Batching plants, hauling, pumps, concrete mixers, types of concrete mixers –tilting, non tilting and reversible drum mixer, concrete vibrators and compaction equipments, types of vibrators,pumping of concrete, under water concreting, ready mix concrete, roller compacted concrete Cold weather concreting, hot weather concreting, Light weight concrete and its types, foam concrete, no fines concrete, self compacting concrete, high density concrete, fiber reinforced concrete, geo – polymer concrete and ferro cement casting technique

Unit V	**Durability of Concrete**	**(07 Hrs)**	**COs Mapped – CO4**

Deterioration: permeability and durability, factors affecting the durability of concrete, chemical attack, and sulphate attack by seawater, acid attack, chloride attack, carbonation of concrete and its determination, corrosion of steel and its control

Repairs: Symptoms and diagnosis of distress, evaluation of cracks, selection of repair procedure, repair of defects, common types of repairs, shotcrete, grouting.Introduction of retrofitting of concrete structures by using fiber reinforced polymer (FRP), polymer impregnated concrete and carbon fibers.

Text Books

1. Concrete Technology by M. S. Shetty, S Chand,New Delhi-110055.
2. Concrete Technology by M. L. Gambhir, Tata McGraw-Hill.

Reference Books

1. Properties of concrete by A. M. Neville, Longman Publishers.
2.Concrete Technology by R.S. Varshney, Oxford and IBH.
3. Concrete technology by A. M. Neville, J.J. Brooks, Pearson.
4. Concrete Mix Design by A. P. Remideos, Himalaya Publishing House.

Strength of CO-PO Mapping														
	PO													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
CO1	3	-	-	-	-	-	-	-	-	-	-	2	1	1
CO2	1	-	-	-	2	-	1	-	1	-	-	1	1	2
CO3	1	-	-	-	-	-	-	-	-	-	-	-	-	2
CO4	1	2	3	1	2	1	1	-	-	-	-	1	2	1
CO5	1	1	1	1	2	1	1	-	-	-	-	1	1	2
Average	**1.4**	**1.5**	**2**	**1**	**2**	**1**	**1**	**-**	**1**	**-**	**-**	**1.25**	**1.25**	**1.6**

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Assignments on Unit-1 to Unit-4	15
2	LMS Test on Each Unit	05
	Total	**20**

S. Y. B. Tech.
Pattern 2023 Semester: IV (B. Tech Civil Engineering)
2304212: Surveying

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory : 03 hrs./week **Practical(2304215) : 04 hrs./week**	**03** **02**	**Continuous Comprehensive Evaluation: 20 Marks** **In Sem Exam: 20 Marks** **End Sem Exam: 60 Marks** **Term work(2304215) : 50 Marks** **Practical Exam(2304215) : 50 Marks**

Prerequisite Courses: - Knowledge of mathematics, units of measurements of distances and angles.

Course Outcomes: The course will enable the students to–

	Course Outcomes	**Bloom's Level**
CO1	Recognize the importance of the fundamental principles of surveying and basic knowledge of surveying during engineering and surveying activity; operations to the various civil engineering projects.	1-Knowledge
CO2	Apply the knowledge of leveling for calculation of the Reduced levels of various points.	2-Understand
CO3	Use the angle measuring instruments (Theodolite) for setting out various civil engineering works.	2. Understanding
CO4	Apply the knowledge of tacheometric surveying for preparation of contour map.	3-Apply
CO5	Calculate data required for setting out of the different curves in the field.	3-Apply

COURSE CONTENTS

Unit I	**Linear Measurements & Angular Measurement**	**(08 Hrs.)**	**COs Mapped - CO1, CO2**

Introduction, Definition, Object of Survey, Primary Division of Surveying, classification of Surveys, Uses of Surveys, Principles of Surveying, Units of Measurement (Linear and Angular measure), Scale and R.F. Introduction to instruments required for Measuring distance and Marking of stations. Direct Ranging. Survey stations, Selection of Stations, Base Line, Check Line, Tie Line and Offsets. Booking Field Notes, Field Work: Equipment, Reconnaissance, and Reference Sketches.

Compass Traversing: Introduction, Open Traverse, Closed Traverse, The Prismatic Compass, Methods of Using Prismatic Compass, Bearing of Lines, Meridians: True, Magnetic, Arbitrary and Grid, Designation of Bearings: Whole Circle System and Quadrantal System, Fore and Back Bearings, Local Attraction, Dip of the Needle, Magnetic Declination.

Unit II	**Levelling**	**(07 Hrs.)**	**COs Mapped - CO1, CO2**

Levelling: Object and Use of Levelling, Definitions, Different Types of Levels: Dumpy Level, Auto Level, and Digital Level. Levelling Staff. Temporary Adjustment of Level, Types of Levelling operations; Simple Levelling, Differential Levelling, Fly Levelling, Longitudinal Profile Levelling, Cross-sectional Levelling, Check Levelling. Curvature and Refraction correction. Reciprocal Levelling.

Methods of calculation of Reduced level: The collimation System and Rise and Fall system. Permanent Adjustment of Level: Two Peg Test only**.** Road Project Survey.

Unit III	**Theodolite Traversing**	**(07 Hrs.)**	**COs Mapped – CO2, CO3**

Theodolite Traversing: Study of 20" Vernier Transit Theodolite, Definitions of Terms, Fundamental Lines (Axes) of Theodolite, Conditions of Adjustments, Temporary Adjustments of Theodolite, Measurement of Horizontal Angle by Repetition and Reiteration Method. Measurement of Vertical Angle. Concept of Direct Angles, Deflection Angles. Setting Out an angle, Prolonging a line. Computation of Latitude and Departure. Balancing of traverse: Omitted Measurements

Preliminary line out and detailed line out of building, necessary precaution to be taken for line out work.

Unit IV	**Tacheometric Survey and Setting of Civil Engineering Works**	**(07 Hrs.)**	**COs Mapped – CO3, CO4**

Tachometry: Introduction, Instruments used in tacheometry, Principle of tachometry, Theory of stadia tacheometry, Determination of Tacheometric Constants. Methods of tacheometry: Fixed hair method-when LOS is horizontal or inclined and staff is held vertically. Numerical.

Contouring: Definition of Contours, Uses of Contour Maps, Characteristics of Contours, Methods of contouring, and Interpolation of Contours.

Tachometric contour Survey.

Unit V	**Curves**	**(07 Hrs)**	**COs Mapped – CO2, CO5**

Introduction, different forms of curves. Definitions and explanation of different terms: Degree of curve, relation between radius and degree of curve, super elevation, centrifugal ratio.

Types of horizontal curves. Notations used with circular curves. Properties of simple circular curve. Horizontal curve setting by- a) Offsets from chord produced and b) Rankine method of deflection angles. Field procedure for setting out curve (by deflection angle) by one and two theodolite method. Compound Curve- calculation of data required for setting out the curve in the field..

Transition curves: Objectives of providing transition curves, Requirement of ideal transition curve. Notations used with combined curves.

Vertical Curves: Definition, Gradient, rate of change of grade, Length of vertical curve, Types of vertical curves.

Text Books

2. Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S. V. Kulkarni, Pune Vidyarthi Griha Prakashan.
3. Surveying, Vol. I & II by Dr. B. C. Punmia, Ashok K. Jain, Arun K. Jain, Laxmi Publications.
4. Plane Surveying & Higher Surveying by Dr A. M. Chandra, New age international publishers New Delhi.

Reference Books

1. Surveying—M. D. Saikia—PHI Learning Pvt .Ltd. Delhi
2. Surveying & levelling by R. Subramanian, Oxford Publication.

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Assignments on Unit-1 to Unit-4	15
2	LMS tests on Each Unit	05
	Total	**20**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: IV (B. Tech Civil Engineering)
2304213: Structural Analysis

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week	**03**	**Continuous Comprehensive Evaluation: 20Marks** **In Sem Exam: 20Marks** **End Sem Exam: 60Marks**

Prerequisite Courses, if any: - Mathematics, Engineering Mechanics and Mechanics of Structures

Course Objectives:
To apply the basic fundamentals of Engineering Mechanics and Mechanics of structure to estimate internal forces in structures.
To understand the structural behavior of indeterminate beams and portal frames and its further application in design of structures.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Identify determinate and indeterminate structures-static and kinematic for their analysis	2-Understanding
CO2	Analyze redundant trusses and perform approximate analysis of multi-story multi-bay frames.	3-Applying
CO3	Solve problems on indeterminate beams and portal frames using slope deflection method.	3-Applying
CO4	Analyze beams and portal frames using moment distribution method.	3-Applying
CO5	Appraise analysis of beams and portal frames by stiffness method.	4-Analysing

COURSE CONTENTS

Unit I	**Fundamentals of Structures, Slope and Deflections and Analysis of Indeterminate Beams**	**(08 Hrs)**	**COs Mapped - CO1**

a) Basic concept of structural analysis-classification of structures, Concept of indeterminacy-static Kinematic.
b) Slopes and deflections in statically determinate beams (Macaulay's method and strain energy method),
c) Analysis of indeterminate beams-fixed beams, propped cantilevers.

Unit II	**Analysis of Pin Jointed Frames and Multi-storied Multi-Bay 2-D Rigid Jointed Frames**.	**(07 Hrs)**	**COs Mapped - CO2**

a) Joint displacements in trusses by Castigliano's Theorem. Analysis of redundant trusses by unit load method for external loading, lack of fit, sinking of support and temperature changes.
b) Approximate methods of analysis of multi-storied multi-bay 2-D rigid jointed frames by Cantilever method and Portal method.

Unit III	**Slope Deflection Method**	**(07 Hrs)**	**COs Mapped – CO3**

Slope Deflection Method-applications to continuous beams and portal frames (sway & non-sway frame)

Unit IV	**Moment Distribution Method**	**(07 Hrs)**	**COs Mapped – CO4**

Moment Distribution Method-applications to continuous beams and portal frames (sway & non-sway frame), Applications in RCC Design.			
Unit V	**Stiffness Method**	**(07 Hrs)**	**COs Mapped – CO5**
Stiffness Method-applications to continuous beams, and portal frames (sway & non-sway frame) Applications in RCC Design, software tools, Introduction to finite element method.			

Text Books

3. Theory of Structures by S. Ramamrutham and R. Narayan, Dhanpat Rai Publishing Company (P) Ltd.
4. Structural Analysis-I & II by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd.
5. Structural Analysis: A Matrix Approach by G.S.Pandit and S. P. Gupta, Tata McGraw Hill Education Pvt. Limited.

Reference Books

1. Basic Structural Analysis by C. S. Reddy, Tata McGraw Hill Education Pvt. Ltd.
2. Structural Analysis by R. C. Hibbler, Pearson Education.
3. Structural Analysis by Aslam Kassimali, Cengage Learning India Private Limited.
4. Mechanics of Structures Vol. II (Theory and Analysis of Structures) by Dr. H. J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt. Ltd.

Strength of CO-PO Mapping

	PO												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	3	1	-	1	-	3	2	-	-	-	3	3
CO2	3	3	3	1	-	1	-	3	2	-	-	-	3	3
CO3	3	3	3	1	-	1	-	3	2	-	-	-	3	3
CO4	3	3	3	1	-	1	-	3	2	-	-	-	3	3
CO5	3	3	3	1	-	1	-	3	2	-	-	-	3	3
Average	3	3	3	1	-	1	-	3	2	-	-	-	3	3

Guidelines for Continuous Comprehensive Evaluation of Theory Course

Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Assignments on Unit-1 to Unit-4	15
2	LMS Test on Each Unit	05
	Total	**20**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S.Y. B. Tech. **Pattern 2023 Semester: IV (B. Tech Civil Engineering)** **2304214 :Concrete Technology Lab**		
Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical:02 hrs/week	**01**	**Term work:25 Marks** **Oral Exam:25 Marks**

Course Objectives:

1. To know the properties of various ingredients of concrete.
2. To learn the behavior of concrete both in its fresh and hardened state.
3. To learn Concrete Mix Design.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Identify the construction materials that can be used in concreting by performing the tests.	3.Apply
CO2	Classify the tests to be performed for Fresh and Hardened concrete	3.Apply
CO3	Perform concrete mix design of normal concrete grade.	4.Analyze

List of Laboratory Experiments/Assignments		
Sr. No.	**Laboratory Experiments (Perform any 8)**	**CO Mapped**
1	Fineness and standard consistency of cement.	**CO1**
2	Initial and final setting time and soundness of cement.	**CO1**
3	Compressive strength of cement.	**CO1**
4	Moisture content, silt content, Density and Specific gravity of fine aggregate	**CO1**
5	Fineness modulus by sieve analysis of fine aggregate.	**CO1**
6	Moisturecontent,waterabsorption,densityandSpecificgravityofcoarse aggregate	**CO1**
7	Fineness modulus by sieve analysis and gradation of Coarse aggregates	**CO1**
8	Workability of fresh concrete(with and with out admixture) by slump Cone Test ,compaction factor, Vee Bee consistometer test	**CO2**
9	Compressive strength test (Cube,Cylinder)of hardened concrete by Direct And indirect test.	**CO2, CO3**
10	Flexuralstrengthtestonbeam	**CO2,CO3**
11	Concrete mix design by IS code method	**CO3**
12	Site visit to any RMC plant/Ongoing construction	**CO1,CO2,CO3**

Strength of CO-PO Mapping														
	PO													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
CO1	1	-	-	-	2	1	-	-	-	-	-	1	1	-
CO2	1	-	1	1	2	2	-	-	-	-	-	1	1	-
CO3	1	2	2	1	2	2	2	-	-	1	1	1	1	1
Average	1	2	1.25	1	2	1.6	2	-	-	1	1	1	1	1

Guidelines for Laboratory Conduction

1. Teacher will briefthegivenexperimenttostudentsitsprocedure,observationscalculation,andoutcome ofthis experiment.
2. Apparatusandequipmentsrequiredfortheallottedexperimentwillbeprovidedbythelabassistantsusing SOP.
3. Studentswillperformtheallottedexperimentinagroup(5studentsineachgroup)underthesupervisionof facultyandlabassistant.
4. Afterperformingtheexperimentstudentswillchecktheir readings, calculations fromtheteacher.
5. Aftercheckingtheyhavetowritetheconclusionofthefinalresult.

Guidelines for Student's Lab Journal

Write-up shouldinclude title,aim,diagram,working principle,procedure, observations,graphs,calculations,conclusionandquestions,ifany.

Guidelines for Term work Assessment

1. Eachexperimentfromlabjournalisassessedforthirtymarksbasedonthreerubrics.
2. RubricR-1fortimelycompletion,R-2forunderstandingandR-3forpresentation/journalwritingwhereeachrubriccarriestenmarks.

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech. **Pattern 2023 Semester: IV (B. Tech Civil Engineering)** **2304215: Surveying Lab**		
Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical : 04 hrs/week	**02**	**Practical Exam : 50 Marks** **Term work : 50 Marks**

Prerequisite Courses, if any: - The basic knowledge of Engineering Mathematic, Physics.

Course Objectives:

1. To comprehend fundamentals and principles of surveying and leveling.
2. To enhance students' capacity to interpret images and extract information of earth surface from multi-resolution imagery at multi-scale level.
3. To study fundamentals and applications of surveying and leveling.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Recognize the importance of the fundamental principles of surveying and basic knowledge of surveying during engineering and surveying activity; operations to the various civil engineering projects.	1-Knowledge
CO2	Apply the knowledge of leveling for calculation of the Reduced levels of various points.	2-Understand
CO3	Use the angle measuring instruments (Theodolite) for setting out various civil engineering works.	2. Understanding
CO4	Apply the knowledge of tacheometric surveying for preparation of contour map.	3-Apply
CO5	Calculate data required for setting out of the different curves in the field.	3-Apply

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Measurement of magnetic bearings of a line using prismatic compass and calculation of correct fore and back bearings of the lines.	**CO1**
2	Determination of Reduced Levels of the various points using Auto level.	**CO2**
3	Determining the positions of the different point using Radiation & Intersection method of plane table surveying.	**CO1**
4	Measurement of horizontal angles using 20" Vernier Transit Theodolite.	**CO2, CO3**
5	Measurement of vertical angles using 20" Vernier transit theodolite	**CO2, CO3**
6	Determination of constants of a Tacheometer by field method.	**CO4**
7	Study and use of Total station.	**CO4, CO5**
8	**Project I:** Road project using Auto level for a minimum length of 1 Km including fixing of alignment, profile leveling, cross-sectioning, plotting of L section and Cross Section. (One full imperial sheet including plan, L-	**CO2,CO3, CO4**

	section and any three typical Cross-sections).	
9	**Project II:** Tachometric contouring project on hilly area with at least two instrument stations about 60 m to 100 m apart and generating contours using both methods, manual as well as using any suitable software such as Autodesk land desktop, Auto-civil, Foresight etc. (minimum contour interval 1 meter).	**CO4**
10	**Project III:** Total Station – Area measurement	**CO4, CO5**

Guidelines for Laboratory Conduction
1. Teacher will brief the given experiment to students its procedure, tools, and outcome of the practical. 2. Computers and software required for the allotted experiment will be provided by the lab assistants using SOP. 3. Students will perform the allotted practical individually under the supervision of faculty and lab assistant. 4. After performing the practical students will check their images/processing from the teacher. 5. After checking they have to write the outcome of the practical.
Guidelines for Student's Lab Journal
Write-up should include title, aim, diagram, procedure, tools, graphs, symbols, images and questions, if any.
Guidelines for Termwork Assessment
1. Each experiment from lab journal is assessed for thirty marks based on three rubrics. 2. Rubric R-1 for timely completion, R-2 for understanding and R-3 for presentation/journal writing where each rubric carries ten marks.

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: IV (B. Tech Civil Engineering)
2304216: Remote Sensing & Geographic Information System

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week **Practical(2304217) :02 hrs/week**	**03** **01**	**Continuous Comprehensive Evaluation: 20 Marks** **In Sem Exam: 20 Marks** **End Sem Exam: 60 Marks** **Term work(2304217) : 25 Marks** **Oral Exam(2304217) : 25 Marks**

Prerequisite Courses, if any: - The basic knowledge of Engineering Mathematic, Physics.

Course Objectives:

1. To comprehend fundamentals and principles of RS and GIS techniques
2. To enhance students' capacity to interpret images and extract information of earth surface from multi-resolution imagery at multi-scale level.
3. To study fundamentals and applications of RS and GIS.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Define fundamentals and principles of RS techniques and photogrammetry.	1-Remember
CO2	Explain fundamentals and applications of GIS.	1-Remember
CO3	Demonstrate the knowledge of remote sensing and sensor characteristics.	2-Understand
CO4	Distinguish working of various spaces-based positioning systems.	3-Apply
CO5	Acquire skills of data processing and its applications using GIS.	4-Analyze

COURSE CONTENTS

Unit I	**Remote Sensing**	**(08 Hrs.)**	**COs Mapped - CO1, CO2.**

Aerial Photogrammetry Objects, Classification- qualitative & quantitative photogrammetry, Applications, comparison of Map and aerial photographs, Flight Planning , Calculation of no of Photographs. Remote Sensing: Definition and scope, history and development of remote sensing technology, electromagnetic radiation (EMR) and electromagnetic spectrum, EMR interaction with atmosphere and earth surface; atmospheric window, RS platforms, elements of remote sensing for visual interpretation viz. tone, shape, size, pattern, texture, shadow and association.

Unit II	**Remote Sensing Satellites and Sensor Characteristics**	**(07 Hrs.)**	**COs Mapped - CO1, CO3, CO4.**

Satellite types and their characteristics, types of sensors, orbital and sensor characteristics of major earth resource satellites, Indian remote sensing satellite programs, introduction to various open-source satellite data portals, global satellite programs, applications of sensor, concept of Swath & Nadir, digital image. Introduction to spatial resolution, spectral resolution, radiometric resolution and temporal resolution.

Unit III	**Global Positioning System and Global Navigation Satellite System**	**(07 Hrs)**	**COs Mapped - CO1, CO4.**

Introduction to GNSS and Types, IRNSS, GPS, GPS components, differential GPS, types of GPS tracking, application of GNSS in surveying, mapping and navigation.

Unit IV	**Fundamentals of GIS**	**(07 Hrs)**	**COs Mapped - CO2, CO5.**
Geographic information system, definition, spatial and non-spatial data, data inputs, data storage and retrieval, data transformation, Introduction to cloud computing (types & applications), data reporting, advantages of GIS, essential elements of GIS hardware, software GIS data types, thematic layers and layer combinations, difference between drafting software's and GIS, fundamentals of cartography and map design, applications of RS and GIS in civil engineering.			
Unit V	**GIS Data and Applications**	**(07 Hrs)**	**COs Mapped - CO2, CO5.**
GIS data types and data representation, data acquisition, geo-referencing of data, projection systems, raster and vector data, raster to vector conversion, attribute data models and its types, remote sensing data in GIS, GIS database and database management system. Applications of land use and land cover pattern. Case studies.			

Text Books

1. Remote Sensing & Geographical Information System, M. Anji Reddy, BS Publications, Hyderabad.
2. Remote Sensing & GIS, Basudeb Bhatta, Third Edition, Oxford University Press (New Delhi).

Reference Books

1. Remote Sensing & Digital Image Processing, John R. Jensen, Department of Geography University of South Carolina Columbia
2. Remote Sensing and Image Interpretation, Lillesand Thomas M. and Kiefer Ralph, John Villey
3. Textbook on Remote Sensing, C. S. Agarwal and P. K. Garg, Wheeler Publishing

Strength of CO-PO Mapping

	PO												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	-	-	3	-	2	-	-	-	-	3	-	-
CO2	3	3	-	-	3	-	2	-	-	-	-	3	-	-
CO3	3	3	-	2	3	-	2	-	-	-	-	3	3	2
CO4	3	3	3	-	3	3	2	-	-	2	-	3	2	-
CO5	3	3	2	2	3	2	2	-	-	-	-	3	2	-
Average	3	3	2.5	2	3	2.5	2	-	-	2	-	3	2.7	2

Guidelines for Continuous Comprehensive Evaluation of Theory Course

Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Assignments on Unit-1 to Unit-4.	15
2	LMS Tests on each unit.	05
	Total	**20**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech. **Pattern 2023 Semester: IV (B. Tech Civil Engineering)** **2304217: Remote Sensing & Geographic Information System Lab**		
Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical : 02 hrs/week	**01**	**Term work : 25 Marks** **Oral Exam : 25 Marks**

Prerequisite Courses, if any: - The basic knowledge of Engineering Mathematic, Physics.

Course Objectives:

1. To comprehend fundamentals and principles of RS and GIS techniques
2. To enhance students' capacity to interpret images and extract information of earth surface from multi-resolution imagery at multi-scale level.
3. To study fundamentals and applications of RS and GIS.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Identify the land use and land cover classification.	1. Remember
CO2	Understand the various methods of visual image interpretation.	`2. Understand
CO3	Explain the function of various tools of QGIS software.	3.Apply
CO4	Prepare the thematic maps of different features.	2. Apply

List of Laboratory Experiments / Assignments

Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Study of fundamental tools of software for data processing	**CO3**
2	Geo-reference and Geo-tag using Google earth/ base map	**CO3**
3	Digitize the given part of toposheet using software & attribute (Name, area, length, as per requirements).	**CO2, CO4**
4	Generation of thematic maps (contour, drainage, road etc.) in software.	**CO4**
5	Visual image interpretation from aerial photos and/or satellite images.	**CO2**
6	Import and export data GIS software to the Auto-CAD or Revit software and mention all the necessary steps used.	**CO3**
7	Preparation of DEM to study geomorphoplogical features and nature of slope.	**CO4**

Guidelines for Laboratory Conduction

1. Teacher will brief the given experiment to students its procedure, tools, and outcome of the practical.
2. Computers and software required for the allotted experiment will be provided by the lab assistants using SOP.
3. Students will perform the allotted practical individually under the supervision of faculty and lab assistant.
4. After performing the practical students will check their images/processing from the teacher.
5. After checking they have to write the outcome of the practical.

Guidelines for Student's Lab Journal

Write-up should include title, aim, diagram, procedure, tools, graphs, symbols, images and questions, if any.

Guidelines for Termwork Assessment

1. Each experiment from lab journal is assessed for thirty marks based on three rubrics.
2. Rubric R-1 for timely completion, R-2 for understanding and R-3 for presentation/journal writing where each rubric carries ten marks.

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: IV (B. Tech Civil Engineering)
2304218: Earth sciences

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :02 hrs./week	02	Continuous Comprehensive Evaluation: 50 Marks

Prerequisite Courses: - Know the importance of geological maps and language helpful for Civil Engineering projects.

Course Outcomes: The course will enable the students to–

	Course Outcomes	Bloom's Level
CO1	Get knowledge about the basic concepts of engineering geology.	1-Knowledge
CO2	Estimation of the importance of mass wasting processes and assessment and Importance of various geological hazards.	2-Understand
CO3	Differentiate and judge between favourable and unfavourable geological conditions for the buildings, roads, dams, tunnels.	2. Understanding
CO4	Ac Acquaintance with various types of geological nature at the foundations of dams, tunnels etc and can evaluate the best site.	3-Apply
CO5	To know various tectonic processes that hampers the design of civil engineering projects and its implications on environment and sustainability.	3-Apply

COURSE CONTENTS

Unit I	**Physical Geology**	**(06 hrs.)**	**COs Mapped - CO1, CO2**

Introduction and scope of Geology and subdivision, Internal structure of the earth, Weathering, Erosion and denudations process on earth material and natural agencies, Geological work of Wind, river underground water and glaciers. Earthquakes: Basics of earthquake, earthquake history, seismic activity, concept of intensity and magnitude of earthquake, causes of earthquake, influence on civil structures and engineering consideration, seismic zonation, Stratigraphy of INDIA-Introduction.

Unit II	**Mineralogy and Petrology**	**(06 hrs.)**	**COs Mapped - CO1, CO2**

Study of physical properties of mineral and study of common rock forming minerals & way of Formation of minerals, Study of three types of rocks with reference to their formation, identification, textural and structural features Rocks and natural materials as a construction material.

Unit III	**Structural Geology**	**(06 hrs.)**	**COs Mapped – CO2, CO3**

Outcrop, stratification, dip and strike relation, Unconformity, joints their types and genesis Faults and folds with their types and causes, Engineering consideration of joints, folds and faults.

Unit IV	**Engineering Geology**	**(06 hrs.)**	**COs Mapped – CO3, CO4**

Basics of Engineering Geology, Importance of geological studies to Engineers and significance of geological Investigations for civil engineering projects, Geology for Site selection of Dam, Tunnel, Reservoir and Highways.

Text Books

1. Mukharjee, P.K., A text book of Geology, The World Press Pvt. Ltd.
2. Kesavulu, C., Textbook of Engineering Geology, Macmillan India Ltd, 1993, New Delhi
3. Bangar, K.M, Principles of Engineering Geology, Standard Publishers Distributors, 1995,New

Delhi
4. Billings, M.P., Structural Geology, Prentice-Hall India, 1974, New Delhi

Reference Books

1. Gokhale, KVG.K and Rao, D.M., Experiments in Engineering Geology, Tata-McGraw Hill, 1981, New Delhi
2. Kesavulu, C. Textbook of Engineering Geology, Macmillan, India Ltd., 1993,New Delhi
3. Lilesand, T.M. and Ralph W. Keifer., Remote sensing and Image Interpretation, John
4. Wiley & Sons, 1987, New York.
5. Reddy, V. Engineering Geology for Civil Engineers; Oxford & IBH, 1997,New Delhi

Guidelines for Continuous Comprehensive Evaluation of Theory Course

Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	Four Assignments on all units.	10
2	LMS test on each Unit	10
3	Site visit & Report	10
4	Presentation	20
	Total	**50**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 Semester: IV (B. Tech Civil Engineering)
2304219: Democracy, Election and Governance

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Tutorial : 02 hrs/week	**02**	**Tutorial: 50 Marks**

Prerequisite Courses, if any: - Basic term of democracy, Importance of Election and governance

Course Objectives:

- This module also aims to make the individual understand the different aspects of democracy and its implications in the overall development of the state.
- The syllabus is introduced from the point of view that all students upon entering into the college, enroll themselves as voters and encourage and enthuse other members of the society to participate not only in election process but also electoral and political process in general.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Understand and practice key principles of Democracy	2-Understand
CO2	Identify how different rights are protected in Democratic systems	2-Understand
CO3	Understand various approaches for Governance	2-Understand
CO4	Reflect on the various threats and challenges to Democracy	3-Apply

COURSE CONTENTS

Unit I	**Democracy- Foundation and Dimensions**	**(08 Hrs)**	**COs Mapped - CO1, CO2, CO4**

Constitution of India, Evolution of Democracy- Different Models, Dimensions of Democracy- Social, Economic, and Political.

Unit II	**Decentralization**	**(08 Hrs)**	**COs Mapped - CO1, CO2, CO3, CO4**

Indian tradition of decentralization, History of Panchayat Raj institution in the lost independence period 73rd and 74th amendments, Challenges of caste, gender, class, democracy and ethnicity.

Unit III	**Governance**	**(08 Hrs)**	**COs Mapped – CO2, CO3, CO4**

Meaning and concepts, Government and governance, Inclusion and exclusion.

Text Books

1. Introduction to the Constitution of India, D. D. Basu, Lexis Nexis, 22nd Edition
2. Essays on contemporary India, Bipan Chandra, Har-Anand Publications.

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Three Assignments on unit-1, Unit-2, Unit-3	30
2	Group Presentation on Unit-3	10
3	LMS Test on Each Unit	10
	Total	**50**

K. K. Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. B. Tech.
Pattern 2023 Semester: IV (B. Tech Civil Engineering)
2304220 : Technical Writing

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Tutorial :01 hr/week **Practical: 02 hrs/week**	**01** **01**	**Term work : 25 Marks** **Tutorial: 25 Marks**

Prerequisite Courses, if any: - Basic understanding of English grammar, Familiarity with research methods and academic writing conventions.

Course Objectives:

1. To equip students with the skills necessary to write technical papers effectively.
2. To enhance students' ability to critically analyze and evaluate technical literature.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Understand the drafting and revising technical papers according to established standards.	2-Understand
CO2	Identify and synthesize information from various sources to produce coherent and well-supported arguments in technical writing.	2-Understand

COURSE CONTENTS

Unit I	**Fundamentals of Technical Writing**	**(06 hrs.)**	**COs Mapped - CO1, CO2**

Introduction to technical writing: purpose and context, elements of technical papers: abstracts, introductions, literature reviews, methodologies, results, discussions, conclusions, and reference, Guidelines for clarity and conciseness in technical writing.

Unit II	**Research and Documentation**	**(06 hrs.)**	**COs Mapped - CO1, CO2**

Conducting literature reviews: searching, evaluating, and synthesizing sources, Citation styles and referencing formats (APA, MLA, IEEE), Ethical considerations in technical writing: plagiarism, authorship, and publication ethics.

Text Books

1. "Technical Communication: A Reader-Centered Approach" by Paul V. Anderson, Cengage Learning.
2. "Writing for Science and Engineering: Papers, Presentations, and Reports" by Heather Silyn-Roberts, Butterworth-Heinemann.

Reference Books

1. "The Craft of Scientific Writing" by Michael Alley, Springer.
2. "Writing and Presenting Scientific Papers" by Birgitta Malmfors, Hans Höglund, and David Otzen, Nottingham University Press.

Strength of CO-PO Mapping														
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	-	-	-	2	-	3	-	-
CO2	-	3	-	3	3	3	-	-	-	3	-	2	-	-
Average	-	3	-	3	3	3	-	-	-	2.5	-	2.5	-	-

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Abstract Writing Assignment.	**CO1,CO2**
2	Literature Review writing	**CO1,CO2**
3	Technical Paper Draft	**CO1,CO2**
4	Citation and Referencing Exercise	**CO1,CO2**
5	Research Ethics Case Study	**CO1,CO2**

Guidelines for Laboratory Conduction

1. Teacher will brief the given experiment to students its procedure, tools, and outcome of the practical.
2. Computers and software required for the allotted experiment will be provided by the lab assistants using SOP.
3. Students will perform the allotted practical individually under the supervision of faculty and lab assistant.
4. After checking they must write the outcome of the practical.

Guidelines for Student's Lab Journal

Write-up should include title, aim, procedure, conclusion.

Guidelines for Termwork Assessment

1. Each experiment from lab journal is assessed for thirty marks based on three rubrics.
2. Rubric R-1 for timely completion, R-2 for understanding and R-3 for presentation/journal writing where each rubric carries ten marks.

Guidelines for Term work Course		
Sr. No.	**Components Term work**	**Marks Allotted**
1	Assignments on Unit-1 to Unit-2.	30
2	LMS Tests	20
	Total	**50**

EXIT COURSES

S. Y. B. Tech.
Pattern 2023 (B. Tech Civil Engineering)
2304221: Internship

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
	02	**Term work: 100 Marks**

Prerequisite Courses, if any: - NA

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Understand the property, use, advantage and disadvantage of different material used in construction.	2-Understand
CO2	Identify different types of concrete and plastering work.	2-Understand

Guidelines of Internship

Internships are educational and career development opportunities, providing practical experience in a field or discipline. Internships are far more important as the employers are looking for employees who are properly skilled and having awareness about industry environment, practices and culture. Internship is structured, short-term, supervised training often focused around particular tasks or projects with defined time scales.

Core objective is to expose technical students to the industrial environment, which cannot be simulated/experienced in the classroom and hence creating competent professionals in the industry and to understand the social, economic and administrative considerations that influence the working environment of industrial organizations.

1. **Duration:**
   Internship to be completed after semester II. At least 2 weeks.
2. **Internship work Identification:**
   Student can take internship work in the form of online/onsite work from any of the following but not limited to:
   a. Working for consultancy/ research project
   b. Participation at events (technical/business) in innovation related completions like Hackathon
   c. Contribution in incubation/innovation/entrepreneurship cell/institutional innovation council/startups cells of institute
   d. Learning at departmental lab/tinkering lab/institutional workshop
   e. Development of new product/business plan/registration of start-up
   f. Participation in IPR workshop/leadership talks/ideal design/innovation/business completion/technical expos
   g. Industry/government organization internship
   h. Internship through Internshala

3. **Internship Diary/ Internship Workbook:**
   Students must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The students should record in the daily training diary the day-to-day account of the observations, impressions, information gathered and suggestions given, if any. The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working

4. **Internship Work Evaluation:**

Every student is required to prepare and maintain documentary proofs of the activities done by him as internship diary or as workbook. The evaluation of these activities will be done by programme head/cell in-charge/project head/ faculty mentor or Industry Supervisor based on overall compilation of internship activities, sub-activities, level of achievement expected, evidence needed to assign the points and the duration for certain activities.

Assessment and evaluation is to be done in consultation with internship supervisor (internal and external) and a supervisor from place of internship.

Recommended evaluation parameters: Post internship internal evaluation 50 Marks and internship diary/workbook and internship report 50 Marks. Evaluation through Seminar Presentation/Viva-Voce at the Institute.

The report shall be presented covering following recommended fields but not limited to:

1. Title/cover Page
2. Internship completion certificate
3. Internship place details: Company background-organization and activities/scope and object of the study/personal observations
4. Index/table of contents
5. Introduction
6. Title/problem statement/objectives
7. Motivation/scope and rationale of the study
8. Methodological details
9. Results/analysis/inferences and conclusion
10. Suggestions/recommendations for improvement to industry, if any
11. Attendance record
12. Acknowledgement
13. List of reference (books, magazines and other sources)

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech.
Pattern 2023 (B. Tech Civil Engineering)
2304222: Introduction to Reinforced Cement Concrete

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :02 hrs/week **Practical:02 hrs/week**	**02** **01**	**In Sem Exam: 20 Marks** **End Sem Exam: 30 Marks** **Term work: 50 Marks**

Prerequisite Courses, if any: - Introduction to Reinforced Concrete Design typically includes Engineering Mechanics, Structural Analysis, Mechanics of Materials, Structural Design Fundamentals, Concrete Technology, and Mathematics.

Course Objectives:

1. Impart knowledge and foster the ability of students to analyze structural behavior in reinforced concrete elements.
2. Impart knowledge and cultivate the ability of students to systematically solve design problems using principles of reinforced concrete design.
3. Impart knowledge and develop the ability of students to apply statistical concepts in reinforced concrete design.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Understand the historical background, development, and significance of reinforced concrete in modern construction.	2-Understand
CO2	Problem-solving skills through practical application of theoretical concepts in reinforced concrete design.	3-Apply
CO3	Apply the concept of theoretical design principles into practical solutions by implementing them in lab-based design exercises.	3-Apply

COURSE CONTENTS

Unit I	**Introduction to Reinforced Concrete**	**(08 Hrs.)**	**COs Mapped - CO1, CO2**

Introduction to RCC, Historical background and development of reinforced concrete. Importance and advantages of reinforced concrete in construction. Properties of concrete and reinforcing steel. Working stress method versus limit state method. Load combinations and safety factors. Structural Design Philosophy, Principles of structural design: strength, serviceability, and durability.

Unit II	**Flexural Design of Reinforced Concrete Elements**	**(08 Hrs.)**	**COs Mapped - CO1, CO2**

Behavior of Reinforced Concrete Elements, Analysis of flexural behavior in reinforced concrete members. Design of Reinforced Concrete Beams, Design considerations for rectangular and T-section beams. Calculation of effective depth and moment of resistance. Determination of reinforcement requirements. Shear reinforcement design: stirrups, shear links, and checks. Design of Reinforced Concrete Slabs, Design considerations for one-way and two-way slabs. Calculation of effective depth, moment of resistance, and reinforcement.

Unit III	Axial and Combined Load Design of Reinforced Concrete Elements	(08 Hrs)	COs Mapped - CO2, CO3

Design of Reinforced Concrete Columns, Types of columns and their behavior under axial loads. Design considerations for short and slender columns. Calculation of axial load carrying capacity and reinforcement. Design of columns subjected to combined axial and bending loads. Design of Reinforced Concrete Footings. Types of footings: isolated footings, combined footings, and mat foundations. Reinforcement detailing for various elements: beams, columns, slabs, and footings.

Text Books

1. "Reinforced Concrete Design" by N. Krishna Raju
2. "Limit State Design of Reinforced Concrete" by B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain
3. "Design of Reinforced Concrete Structures" by M. L. Gambhir

Reference Books

1. "Introduction to Reinforced Concrete Structures" by S. Ramamrutham
2. "Introduction to Design of Reinforced Concrete Structures" by S.N. Sinha
3. "Introduction to Reinforced Concrete Design" by P.C. Varghese

	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	2	3	0	0	0	0	0	0	0	0
CO2	3	3	2	3	0	0	0	0	0	0	0	3
CO3	0	0	2	3	0	2	0	0	2	0	0	0
Average	2	1.67	2	3	0	0.67	0	0	0.67	0	0	1

List of Laboratory Experiments / Assignments

Sr. No.	Laboratory Experiments / Assignments	CO Mapped
1	One-Way and Two-Way Slab Design	**CO1,CO2,CO3**
2	Case Studies on Historical Reinforced Concrete Structures	**CO1,CO2,CO3**
3	Design of Reinforced Concrete Beam	**CO1,CO2,CO3**
4	Design of Reinforced Concrete column	**CO1,CO2,CO3**
5	Design Spreadsheet Exercises	**CO1,CO2,CO3**

Guidelines for Laboratory Conduction
1. Teacher will brief the given experiment to students its procedure, tools, and outcome of the practical. 2. Computers and software required for the allotted experiment will be provided by the lab assistants using SOP. 3. Students will perform the allotted practical individually under the supervision of faculty and lab assistant. 4. After checking they have to write the outcome of the practical.
Guidelines for Student's Lab Journal
Write-up should include title, aim, numerical and code.
Guidelines for Termwork Assessment
1. Each experiment from lab journal is assessed for thirty marks based on three rubrics. 2. Rubric R-1 for timely completion, R-2 for understanding and R-3 for presentation/journal writing where each rubric carries ten marks.

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S. Y. B. Tech.
Pattern 2023 (B. Tech Civil Engineering)
2304223: Estimation and Costing of Buildings

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :02 hrs/week **Practical:02 hrs/week**	**02** **01**	**In Sem Exam: 20 Marks** **End Sem Exam: 30 Marks** **Term work: 50 Marks**

Prerequisite Courses, if any: - The basic knowledge Building Construction, Concrete Technology Building Drawing.

Course Objectives:

1 . Impart knowledge to prepare approximate estimate
2 Understand the detailed estimate of Civil Engineering works
3 To study the detailed specification and work out rate analysis according to material, labor requirements as per specified norms.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Understand concept of estimate and mode of measurement.	1-Remember
CO2	Prepare detailed estimate of various items of work by using different methods of taking out quantities.	3-Apply
CO3	Apply concepts of specification to draft brief specification, detailed specification and prepare detailed rate analysis for different items of work	4-Analyze

COURSE CONTENTS

Unit I	**Introduction to Estimating & Costing**	**(08 Hrs.)**	**COs Mapped - CO1**

Definition of estimation, valuation, purpose, and data required for estimation, types, concept of item of work, different items of work of buildings, units and mode of measurement for different items of work, measurement form and abstract form (Bill of Quantities). Administrative approval and technical sanction, prime cost, provisional sum and provisional quantities, contingencies, rate analysis, lead statement, work charge establishment, centage charges, contents of S. S. R.

Unit II	**Detailed estimate**	**(08 Hrs.)**	**COs Mapped - CO2**

Detailed estimates: factors to be considered while preparing detailed estimate, methods of detailed estimate-PWD and Centre line method, taking out quantities for load bearing and R.C.C framed structures as per IS 1200, bill of quantities. Bar Bending Schedule: introduction to bar bending schedule and its importance, preparing bar bending schedule for RCC members of building.

Unit III	**Specifications and Rate Analysis**	**(08 Hrs)**	**COs Mapped - CO3**

Necessity of specifications, purpose, types, drafting detailed specifications for major items of Civil Engineering works like earthwork, PCC, Masonry (stone & brick), RCC, Plastering, flooring, painting and road, Rate Analysis: purpose, importance, factors affecting rate of an item of work, overheads, task-work, procedure for rate analysis, rate analysis for major items of civil engineering works- like earthwork, PCC, masonry-stone & brick, RCC structural elements, plastering, flooring.

Text Books
1. A Textbook of Estimating and Costing (Civil), D D Kohli and R C Kohli, S. Chand & company, New Delhi.
2 Estimating and Costing in Civil Engineering: Theory and Practice, B. N Dutta and S. Dutta , 28th revised edition, CBS Publishers and distributors
3 Estimating and Costing, R. C. Rangwala, Charotar Publishing House Pvt Ltd, Anand.
Reference Books
1 Estimating, Costing Specifications & valuation in Civil Engineering, M. Chakraborty.
2 A Text Book of Estimating and Costing for Civil Engineering, G.S. Birdie, Dhanpat Rai Publishing Company
3.Estimating and Costing in Civil Engineering: Theory and Practice, B. N Dutta and S. Dutta , 28th revised edition, CBS Publishers and distributors.

	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	1	1	-	-	-	2	-	1	-	1	1	-
CO2	2	1	1	-	-	2	-	1	-	1	1	1
CO3	3	3	3	2	2	2	1	2	-	3	2	2
Average	2	1.66	2	2	2	2	1	1.33	-	1.66	1.66	1.5

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Report on study of contents & use of DSR/SSR.	**CO1**
2	Detailed estimate of single story load bearing structure.	**CO2**
3	To draft detailed specification important items of work.	**CO3**

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